WATTAGE

TANGENT

Electric-Powered Park-Flyer Pattern Plane

INSTRUCTIONS FOR FINAL ASSEMBLY

The Wattage Tangent EP is distributed exclusively by Global Hobby Distributors 18480 Bandilier Circle, Fountain Valley, CA 92708

GLOBAL

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Kit Product Number 128417

Specifications:

- Wing Span: 31.5 Inches
- Wing Area: 183 Square Inches
- Length: 31 Inches
- Weight RTF: 15 - 17 Ounces
- Functions: Ailerons, Elevator, Rudder and Throttle
- Power: 370 Motor w/3.67:1 Gear Box & 7.5 x 5 Propeller
- Radio: 4 Channel Micro w/3 Servos & 15 AMP ESC

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SAFETY WARNING

This R/C airplane is not a toy! If misused or abused, it can cause serious bodily injury and/or damage to property. Fly only in open areas and preferably at a dedicated R/C flying site. We suggest having a qualified instructor carefully inspect your airplane before its first flight. Please carefully read and follow all instructions included with this airplane, your radio control system and any other components purchased separately.

FOR YOUR INFORMATION

To make your modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help with assembly and during your first flights. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors. If there is no hobby shop in your area, we recommend that you contact the AMA at the address below. They will be able to help you locate a flying field near you.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie IN 47302-9252
(800) 435-9262
www.modelaircraft.org

OUR GUARANTEE

Wattage guarantees this kit to be free from defects in both material and workmanship, at the date of purchase. This does not cover any component parts damaged by use, misuse or modification. In no case shall Wattage's liability exceed the original cost of the purchased kit.

In that Wattage has no control over the final assembly or material used for final assembly, no liability shall be assumed for any damage resulting from the use by the user of the final user-assembled product. By the act of using the final user-assembled product, the user accepts all resulting liability.

INTRODUCTION

Thank you for purchasing the new Wattage Tangent EP pattern plane. Before completing the final assembly of your new airplane, please carefully read through this instruction manual in its entirety. Doing so will ensure your success the first time around!

Wattage Tangent EP Features:

- 370 Size Motor w/3.67:1 Gear Box and 7.5 x 5 Nylon Propeller
- Great Flight Characteristics - Smooth, Stable and Aerobatic
- Carbon Fiber Reinforced Fiberglass Fuselage, Belly Pan and Cowling
- High-Strength Foam Wing and Rudder w/Carbon Fiber Reinforced Stabilizer
- Can Take Off from the Ground or Can Be Hand-Launched
- Generous Hardware and Custom Decal Sheet Included
- Fast and Easy Assembly - Over 70 High Resolution Digital Photos Included

This instruction manual is designed to guide you through the entire final assembly process of your new airplane in the least amount of time possible. Along the way you'll learn how to properly assemble your new airplane and also learn tips that will help you in the future. We have listed some of our recommendations below. Please read through them before beginning assembly.

- Please read through each step before beginning assembly. You should find the layout very complete and straightforward. Our goal is to guide you through assembly without any of the headaches and hassles that you might expect.
- There are check boxes next to each step. After you complete a step, check off the box. This will help prevent you from losing your place.
- Cover your work table with brown paper or a soft cloth, both to protect the table and to protect the parts.
- Keep a couple of small bowls or jars handy to put the small parts in after you open the accessory bags.
- We're all excited to get a new airplane in the air, but take your time. This will ensure you build a straight, strong and great flying airplane.
- If you come across this symbol ☞, it means that this is an important point or an assembly hint.

If you should find a part missing or damaged, or have any questions about assembly, please contact us at the address below:

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Phone: (714) 963-0329 Fax: (714) 964-6236 E-mail: service@globalhobby.net

Visit our website at http://globalservices.globalhobby.com

To serve your needs better, please include your email address with any correspondence you send to us. Your email address will be added to our Customer Service Database so you will automatically receive free updates and tech notices for your particular product. You will also receive repair status updates (if applicable) and other important information about your product as it becomes available.

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SECTION 1: OUR RECOMMENDATIONS

This section describes the items you will need to purchase for your new Tangent EP. These suggestions are not set in stone, but they should provide you with a good starting point.

IMPORTANT

When choosing accessories for your Tangent EP, such as servos, ESC, and receiver, it's very important to take the weight of these items into consideration. Remember, the lighter the overall weight of the finished airplane, the better the airplane will fly.

What Servos Do I Use?

The servos you use should be the lightest available, yet still have an adequate amount of torque. We suggest using servos that weigh no more than 0.19 ounces and have a torque rating of no less than 7.0 ounces per square inch.

What Receiver Do I Use?

The receiver should be as light as possible, preferably 1/2oz. or less. Most four-channel micro receivers would be a good choice. If you plan on using the Hitec 555 Micro receiver, we suggest removing the case to reduce the receiver's weight. If you do remove the case from your receiver we strongly suggest wrapping the receiver with heat-shrink material to protect the internal components.

Note: We don't suggest using short-range receivers like the Hitec Feather or Cirrus MRX-4. The range provided by these receivers will not be long enough for you to keep control of the airplane.

What Electronic Speed Control Do I Use?

The ESC you choose should be capable of handling 10-15 amps continuous current. Again, lighter is better. Your ESC should weigh no more than 1 ounce including the wiring and switch.

Note: Although a 10 amp ESC may work with our recommended battery, motor, gear box and propeller, it is at the low end of the scale. Since some customers may wish to experiment with other motors, gear boxes, batteries and propellers, chances are a 15 amp ESC will then be necessary because of higher current draw; therefore, we recommend just starting with a higher-capacity ESC.

What Flight Battery Do I Use?

To get good flight performance you need to use the right type of flight battery. You need a flight battery that can deliver enough voltage and be able to handle current draw up to approximately 8 - 10 amps. Through much testing on this power system, we have found the 8 cell 800Mah 5/4AAA NiMH battery pack delivers the best performance in terms of weight, power and duration. You certainly could use NiCD battery packs - they will give you more power, but they are heavier and offer much less duration than NiMH batteries. Depending on how you fly the airplane, the trade-off between higher weight and less duration may not be worth the extra power.

Note: At the time of this writing, most NiMH batteries cannot withstand current draw above 10 amps. If you use our included 370 size motor, gear box and propeller, current draw will not be a problem. However, if you experiment with larger propellers or different motors and gear boxes, the current draw may be too high for NiMH batteries. If this is the case, you will need to use NiCD batteries in your airplane. NiMH battery technology is evolving quickly, so in the future they may be compatible with high-draw power systems.

Here's What We Used to Finish Our Tangent EP Pattern Plane:

P/N	759118	Hitec 555 Micro Receiver
		Hitec Dual Conversion FM RX Crystal
P/N	444052	Cirrus CS-10 Super-Micro Servos (3)
P/N	128484	Wattage IC-15A Micro ESC
P/N	128538	Wattage 8 Cell 800Mah 5/4AAA NiMH Flight Battery
P/N	130103	Wattage 7-8 Cell AC/DC Peak Charger
		3M 3/4" Wide Clear Plastic Tape - Available at Most Hardware Stores

Note: To minimize current loss, we suggest soldering the motor wires directly to the ESC.

IMPORTANT

The part numbers listed for the Hitec receiver, Cirrus servos and Wattage ESC are compatible with Hitec and JR (receiver is compatible with Hitec only) radio control systems. These items are also available with connectors that are compatible with Futaba and Airtronics radio control systems. (Micro 555 receiver is also available for Airtronics, Futaba and JR radio systems.)

When you purchase the Hitec Micro 555 receiver, you must also purchase a Hitec brand crystal compatible with the receiver. The crystal must also be on the same frequency as your transmitter. Note that the Micro 555 receiver uses a dual conversion FM Hitec crystal.

SECTION 2: TOOLS AND SUPPLIES REQUIRED

- ❑ Kwik Bond 5 Minute Epoxy # 887560
- ❑ Kwik Bond Thin C/A # 887500
- ❑ Lightweight Oil or Vaseline
- ❑ # 0 Phillips Head Screwdriver
- ❑ # 1 Phillips Head Screwdriver
- ❑ Magnum Z-Bend Pliers # 237473
- ❑ Wire Cutters
- ❑ Needle Nose Pliers
- ❑ Adjustable Wrench
- ❑ Excel Modeling Knife # 692801
- ❑ Scissors
- ❑ Electric or Hand Drill
- ❑ Assorted Drill Bits
- ❑ Ruler
- ❑ Pencil
- ❑ Masking Tape
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Rotary Tool w/Cutting Wheel & Sanding Drum
- ❑ Push-Pins
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks # 864204
- ❑ NHP Epoxy Mixing Cups # 864205
- ❑ K&S 30 Watt Soldering Iron # 598120
- ❑ Heat-Shrink Tubing
- ❑ Solder

SECTION 3: KIT CONTENTS

We have organized the parts as they come out of the box for easier identification during assembly. Before you begin assembly, group the parts like we list them below. This will ensure that you have all of the parts before you begin assembly and it will also help you become familiar with each part. If you find any parts missing or damaged, please contact us at the address below:

Global Services
18480 Bandilier Circle
Fountain Valley CA 92708

Phone: (714) 963-0329 Fax: (714) 964-6236 E-mail: service@globalhobby.net

AIRFRAME ASSEMBLIES

- ❑ (1) Fiberglass Fuselage
- ❑ (1) Left & Right Wing Panels
- ❑ (1) Horizontal Stabilizer w/Elevator Halves
- ❑ (1) Rudder
- ❑ (1) Fiberglass Cowling

LANDING GEAR ASSEMBLIES

- ❑ (2) Prebent Main Landing Gear Wires
- ❑ (1) Tail Wheel Assembly
- ❑ (2) Plastic Main Gear Wheels
- ❑ (2) Plastic Main Gear Wheel Retainers
- ❑ (2) Rubber Bands
- ❑ (2) Nylon Main Landing Gear Mounts
- ❑ (2) 2mm x 5mm Wood Screws

MISCELLANEOUS STABILIZER PARTS

- ❑ (1) Carbon Fiber Dowel
- ❑ (1) Self-Adhesive White Tape
- ❑ (1) Prebent Elevator Joiner Wire
- ❑ (1) Elevator Reinforcement Board - 2 Parts
- ❑ (2) Nylon Hinges

MOTOR ASSEMBLY

- ❑ (1) 370 Size Motor w/Gear Box
- ❑ (1) 7.5 x 5 Nylon Propeller
- ❑ (1) Spinner Assembly - Front & Back
- ❑ (2) 3mm Hex Nuts
- ❑ (1) 3mm Flat Washer
- ❑ (3) 2.5mm x 12mm Wood Screws

CONTROL SYSTEM ASSEMBLIES

- ❑ (2) 1.5mm x 150mm Threaded Wires
- ❑ (2) 1.5mm x 400mm Threaded Wires
- ❑ (2) Prebent Aileron Torque Rods
- ❑ (2) Nylon Control Horns
- ❑ (2) Nylon Control Horn Backplates
- ❑ (2) Nylon Adjustable Control Horns
- ❑ (4) Nylon Clevises
- ❑ (1) Aileron Reinforcement Board - 2 Parts

MISCELLANEOUS WING PARTS

- ❑ (1) Center Section Reinforcement Board
- ❑ (1) Trailing Edge Reinforcement Board
- ❑ (1) Fiberglass Belly Pan
- ❑ (1) 3mm Plywood Plate w/Tab
- ❑ (1) 3mm Plywood Plate - Rounded w/Notch
- ❑ (1) 3mm Plywood Plate - Rounded w/Cutout
- ❑ (3) 3mm x 15mm x 20mm Plywood Plates
- ❑ (2) 180mm Balsa Support Rails
- ❑ (1) 30mm Fiberglass Dowel
- ❑ (1) 3mm x 18mm Wood Screw

MISCELLANEOUS FUSELAGE PARTS

- ❑ (1) Prepainted Canopy Cover - Optional
- ❑ (1) Foam Radio Tray
- ❑ (1) Servo Mounting Board
- ❑ (1) 150mm Balsa Rudder Post
- ❑ (2) 2mm x 5mm Wood Screws
- ❑ (1) Double-Sided Foam Tape
- ❑ (1) Decal Sheet

WARNING

The Tangent EP includes a foam wing, stabilizer and rudder. It is very important that you use no solvents, Cyanoacrylate (C/A) glue, or paint that can damage foam. If any of these chemicals comes in contact with the foam parts, the parts will be destroyed and will not be covered under warranty. Use only epoxy on the foam parts where glue is required. If you decide to add painted details to the airplane, use acrylic-based paints and always test the paint on a scrap piece first.

We do not suggest storing your airplane in an extremely hot environment (like the back of your car in direct sunlight) for any length of time. The extreme heat could cause the fiberglass to buckle, the foam to melt and possibly damage the fragile components of the radio system, ESC or batteries.

SECTION 4: REPLACEMENT PARTS

Wattage stocks a complete line of replacement parts for your Tangent EP. Listed below are the replacement parts that are available along with their respective part numbers for easy ordering convenience. We suggest ordering directly from your local dealer. If your dealer does not stock Wattage products, you can order directly from us at the address shown below:

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On the Web
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Wattage Tangent EP - Complete	128417	Pushrod Wires (4)	152110
Instruction Manual	145385	Clevis & Horn Set (2ea.)	152112
Wing Set	145387	Torque Rod Set	152120
Fuselage Set	145388	Nylon Hinges (6)	152130
Belly Pan Only	145392	370 Electric Motor Only	131350
Stabilizer Set w/Carbon Rod	145390	370 Motor Set w/Gear Box & Prop	145346
Cowling	145389	3.67:1 Gear Box Only	131371
Canopy Cover	145391	Gear Set for 3.67:1 Gear Box	131376
Decal Set	145386	Spinner Assembly	145310
Main Landing Gear Set	152280	Nylon Propeller	131381
Tail Wheel Assembly	152100		

SECTION 5: METRIC CONVERSION CHART

To convert inches into millimeters: Inches x 25.4 = mm

To convert millimeters into inches: Millimeters / 25.4 = in

1/64"	=	.4mm	3/16"	=	4.8mm	1"	=	25.4mm	21"	=	533.4mm
1/32"	=	.8mm	1/4"	=	6.4mm	2"	=	50.8mm	24"	=	609.6mm
1/16"	=	1.6mm	3/8"	=	9.5mm	3"	=	76.2mm	30"	=	762.0mm
3/32"	=	2.4mm	1/2"	=	12.7mm	6"	=	152.4mm	36"	=	914.4mm
1/8"	=	3.2mm	5/8"	=	15.9mm	12"	=	304.8mm			
5/32"	=	4.0mm	3/4"	=	19.0mm	18"	=	457.2mm			

SECTION 6: WING ASSEMBLY & MOUNTING

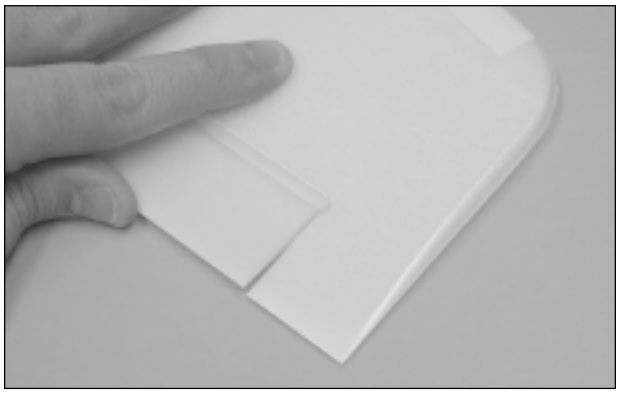
YOU'LL NEED THE FOLLOWING PARTS:

- ❑ (1) Fiberglass Fuselage
- ❑ (1) Left & Right Wing Panels
- ❑ (1) Center Section Reinforcement Board
- ❑ (1) Trailing Edge Reinforcement Board
- ❑ (1) Fiberglass Belly Pan
- ❑ (1) 3mm Plywood Plate w/Tab
- ❑ (1) 3mm Plywood Plate - Rounded w/Notch
- ❑ (1) 3mm Plywood Plate - Rounded w/Cutout
- ❑ (3) 3mm x 15mmm x 20mm Plywood Plates
- ❑ (2) 180mm Balsa Support Rails
- ❑ (1) 30mm Fiberglass Dowel
- ❑ (1) 3mm x 18mm Wood Screw
- ❑ (2) Prebent Aileron Torque Rods
- ❑ (1) Aileron Reinforcement Board - 2 Parts

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond 5 Minute Epoxy
- ❑ # 1 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ Electric or Hand Drill
- ❑ 5/64", 7/64" and1/8" Drill Bits
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Rotary Tool w/Cutting Wheel & Sanding Drum
- ❑ Masking Tape
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

Step 1: Cutting Out the Ailerons



❑ Turn one wing panel upside down, so the molded aileron hinge groove is facing up toward you.

❑ Use a modeling knife and a ruler to carefully cut out the inner and outer end of the aileron at each end of the groove.

☞ Make the cuts perpendicular to the trailing edge of the wing.

❑ Carefully flex the aileron up and down several times to free up the hinge line.

If the ailerons seem stiff, you can correct this by VERY GENTLY AND LIGHTLY dragging your modeling knife blade down the hinge line once or twice. This will make a very shallow cut in the hinge line and reduce the stiffness. Be careful not to cut through the hinge line!

❑ Repeat the previous procedures to cut out the aileron on the second wing panel.

Step 2: Joining the Wing Panels

❑ Test-fit the two wing panels together. They should fit together with few or no gaps between the two, and the leading and trailing edges should line up evenly.

❑ If the wing panels don't fit together properly, carefully sand the root ends of each wing panel straight using 220 grit sandpaper with a sanding block, being careful not to change the dihedral angle.

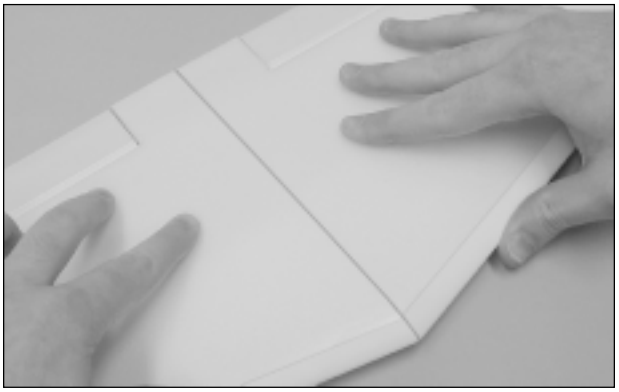
IMPORTANT

Before gluing the wing panels together in the next procedure, it's important to know that the top of the wing should be straight across (flat). You can easily achieve this by gluing the wing panels together upside down on your building table.

❑ Mix a generous amount of 5 minute epoxy and carefully apply a thin layer to the root ends of both wing panels.

WARNING

For maximum wing strength, make sure to cover the entire surface of each root end.



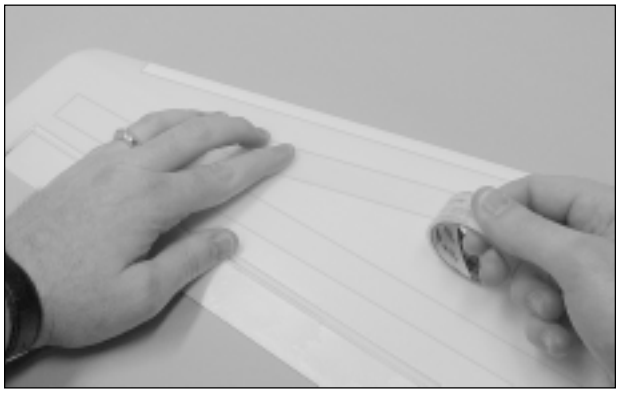
❑ Fit the wing panels back together and realign them. Remove any excess epoxy that squeezes out of the joint using a paper towel and rubbing alcohol, and hold the wing panels together firmly until the epoxy sets up - about 10 minutes.

☞ Before the epoxy sets up, double-check that the top of the wing is flat.

❑ After the epoxy has cured, apply a strip of clear plastic tape (not included) to the top of the wing, over the center section joint, from the leading edge to the trailing edge.

❑ Trim the ends of the tape flush with the wing using a modeling knife.

❑ Using the same technique, apply a strip of clear plastic tape over the center section joint on the bottom of the wing.



❑ Apply two long strips of clear plastic tape to the bottom of the wing. Apply the strips of tape down the middle of the wing, perpendicular to the center section joint, from wing tip to wing tip.

☞ These strips of tape help strengthen the wing. Do not omit this procedure.

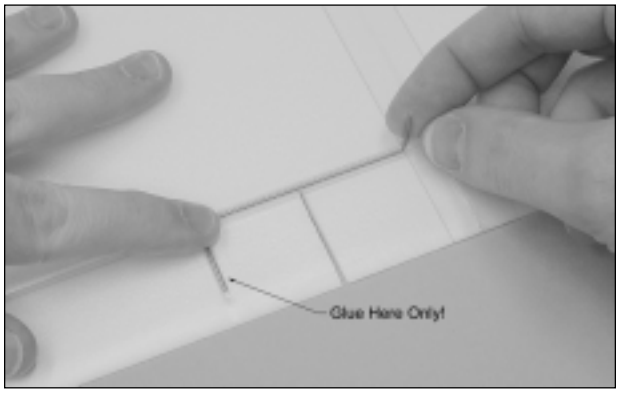
Step 3: Installing the Aileron Torque Rods

❑ Test-fit each prebent torque rod into the molded grooves in the top of each wing panel. The top of each torque rod should be even with the top of the wing.

☞ There is a left and right torque rod. Note that the smooth end of the torque rods goes into the ailerons.

IMPORTANT

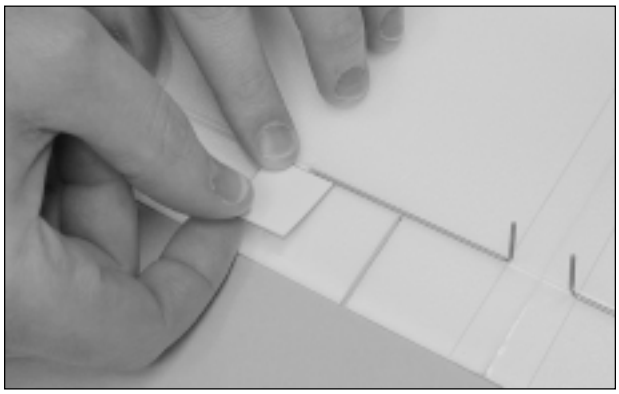
So the torque rods lay flat in the molded grooves, you may need to carefully cut the strip of clear tape where it crosses over the grooves.



❑ Mix a small quantity of 5 minute epoxy and use it to glue the torque rods into ONLY the ailerons as shown. Remove any excess epoxy using a paper towel and rubbing alcohol, and allow the epoxy to set up before proceeding.

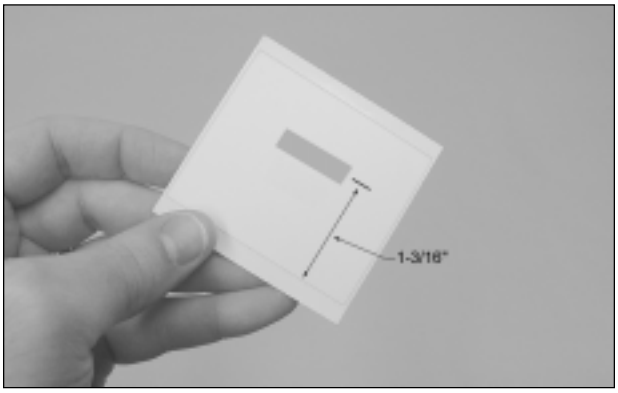
WARNING

Do not glue the torque rods to the wing or to the leading edge of the ailerons. If you do this, the ailerons will be glued solid and won't be able to pivot up and down.



❑ After the epoxy has set up, apply one piece of aileron reinforcement board onto each aileron to secure the torque rods firmly into place.

Step 4: Installing the Wing Reinforcement Board

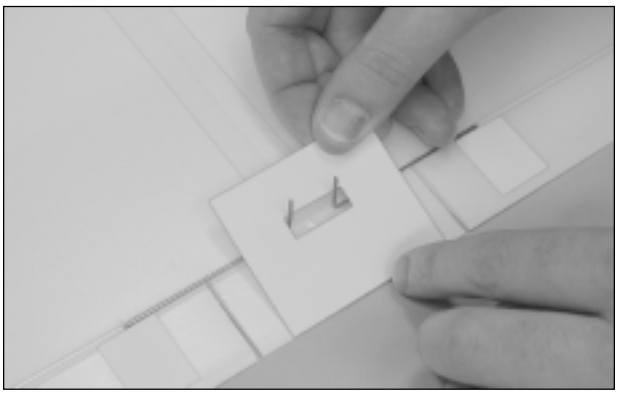


❑ Using a modeling knife and a ruler, cut a 1/4" x 7/8" hole, 1-3/16" up from the bottom of the trailing edge reinforcement board.

☞ This hole will prevent the reinforcement board from interfering with the aileron torque rods when it is installed.

IMPORTANT

Before installing the trailing edge reinforcement board in the next procedure, make sure that both aileron torque rods are completely down in the molded grooves.

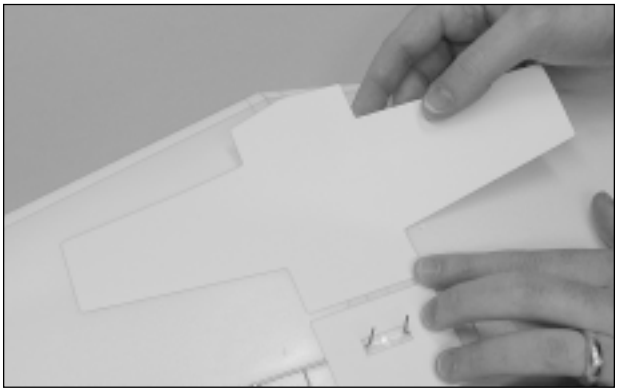


❑ Remove the protective backing from the trailing edge reinforcement board.

❑ Carefully apply the reinforcement board to the top of the wing, making sure the board is centered over the centerline of the wing and the back edge of the board is even with the trailing edge of the wing.

❑ Flex the ailerons up and down several times to make sure the torque rods are not sticking to the reinforcement board.

❑ Carefully remove the protective backing from the wing reinforcement board.

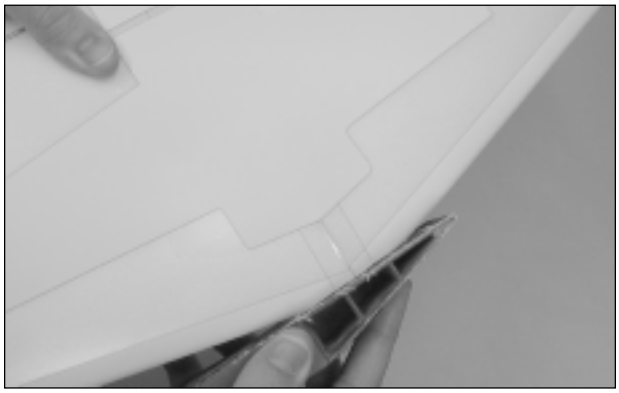


❑ Carefully apply the reinforcement board to the top of the wing, making sure that it's centered over the wing's centerline and that the back edge of the reinforcement board is about 1/8" in front of the trailing edge reinforcement board.

IMPORTANT

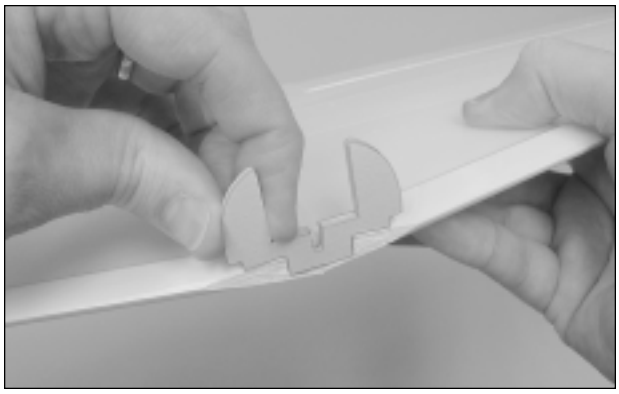
It's very important to the integrity of the wing that the reinforcement board be adhered to the wing along its entire surface.

Step 5: Installing the Battery Tray & Belly Pan Support Rails



❑ Using a ruler and a pencil, measure back 3/16" from the leading edge of the wing, at the centerline, and draw a mark.

❑ Using 220 grit sandpaper with a sanding block, carefully sand the front of the wing straight across, back to the mark you drew.



❑ Using a modeling knife, cut a notch in the bottom leading edge of the wing and test-fit the 3mm plywood plate (rounded w/cutout) into place as shown.

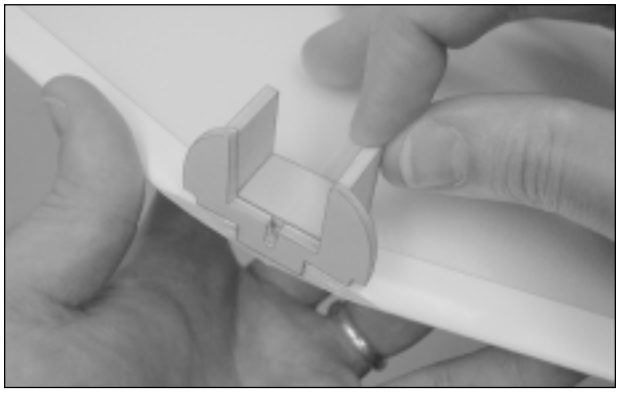
☞ The front of the plywood plate should be even with the leading edge of the wing and the angled cuts in the bottom of the plate should fit flush with the bottom of the wing. It's also important that the small U-shaped cutout in the plate be centered over the centerline of the wing (the glue joint).

❑ When satisfied with the fit, remove the plywood plate and mix a small quantity of 5 minute epoxy.

❑ Glue the plate into place making sure that it is perpendicular to the bottom of the wing and not angled forward or backward. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the plate in place until the epoxy sets up.

IMPORTANT

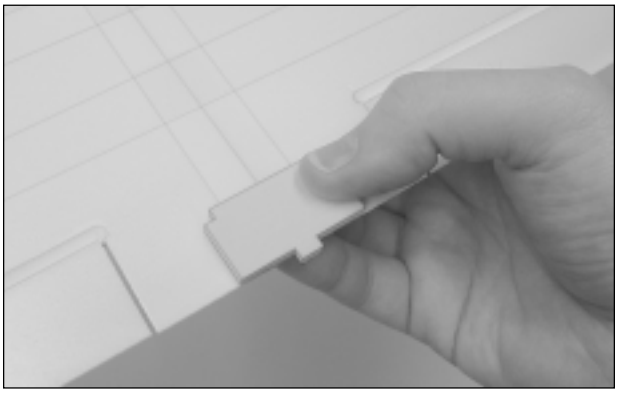
Making sure that the plywood plate is perpendicular to the bottom of the wing will ensure that it lines up properly with the fuselage when the wing is mounted.



❑ Test-fit the three 3mm x 15mm x 20mm plywood plates to the wing as shown. When aligned properly, the plates should be pushed up against the back of the front plate and pushed down against the bottom of the wing.

❑ When satisfied with the alignment, mix a small quantity of 5 minute epoxy and glue the three plates into place. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the plates in place until the epoxy sets up.

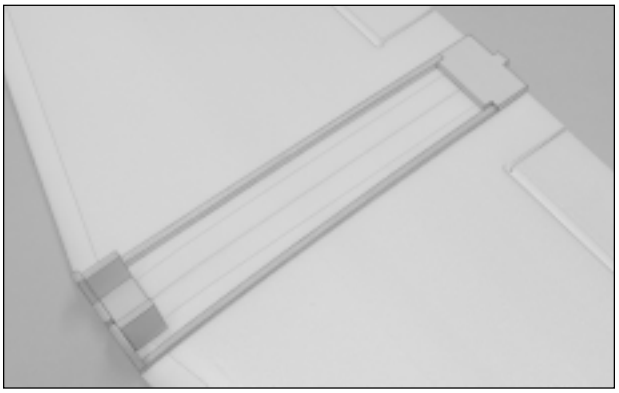
☞ To make it easier we installed the bottom plate first, allowed the epoxy to set up, then installed the two side plates.



❑ Test-fit the plywood plate (with tab) to the bottom of the wing. When aligned properly, the back of the plate (not the tab) should be even with the trailing edge of the wing and the plate should be centered over the wing's centerline. Notice that the tab hangs over the trailing edge.

☞ So that the belly pan will line up with the fuselage when the wing is mounted, it's important that the plywood plate be centered over the centerline of the wing.

❑ When satisfied with the alignment, glue the plate into place using a small quantity of 5 minute epoxy. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the plate in place until the epoxy sets up.

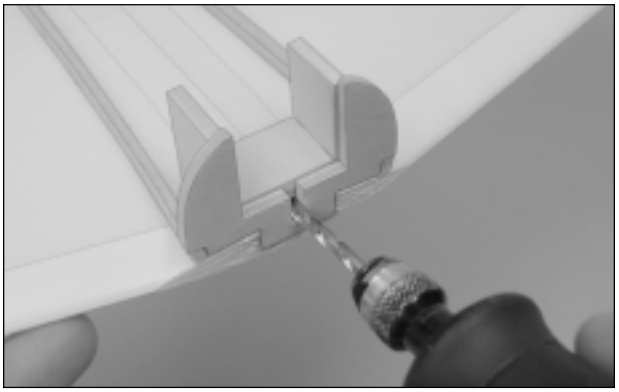


❑ Test-fit the two 180mm long balsa support rails into the notches in the front and back plywood plates. When aligned properly, the balsa rails should fit firmly against the bottom of the wing and they should be straight from the front plate to the back plate - check this using the straight edge of your ruler. They should not be bowed in or out.

❑ When satisfied with the alignment, glue the support rails into place using a small quantity of 5 minute epoxy. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the rails in place using pieces of masking tape until the epoxy sets up.

❑ After the epoxy sets up, remove the masking tape and carefully sand the excess balsa even with the front of the plywood front plate.

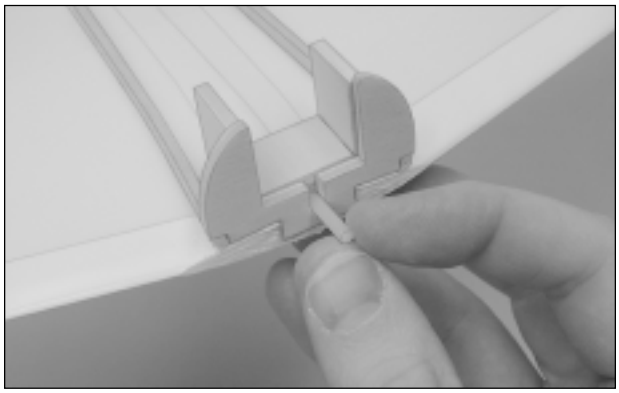
Step 6: Mounting the Wing to the Fuselage



❑ Carefully drill a 7/64" diameter hole, 3/4" deep, in the leading edge of the wing, at the base of the U-shaped cutout in the plywood plate.

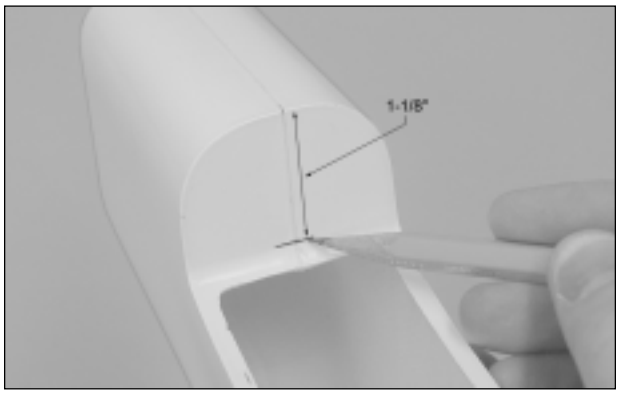
IMPORTANT

Make sure to drill the hole straight and not at an angle.

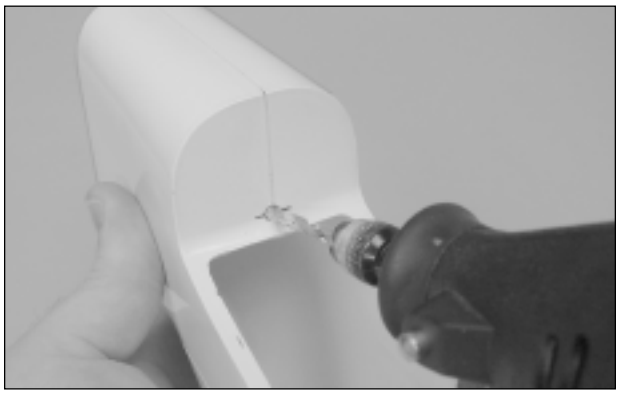


❑ Test-fit the 30mm long fiberglass dowel into the hole. The dowel should be pushed into the hole deep enough so that 3/8" of it is beyond the leading edge. It is also important that the dowel be straight and not angled up, down or side to side.

❑ When satisfied with the alignment, glue the dowel into place using a generous amount of 5 minute epoxy. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the dowel in place and aligned until the epoxy sets up.



❑ Using a ruler and a pencil, carefully mark the location of the wing dowel hole at the front of the wing saddle. The hole should be located on the centerline of the fuselage (the mold seam) and 1-1/8" up from the bottom of the fuselage.



❑ Using the tip of your modeling knife, carefully make a small pilot hole in the centerline of the fuselage at the mark you drew.

❑ Using a 1/8" drill bit, carefully drill a hole through the fuselage, using the pilot hole as your guide.

☞ When drilling the hole, try to drill it parallel with the bottom of the fuselage.

❑ Place the wing into the wing saddle and push the trailing edge down firmly into place.

☞ Double-check that the dowel in the leading edge of the wing fully engages the hole in the fuselage. You may have to push the wing forward firmly and/or make fine adjustments to the hole so that the front of the wing sets properly in the wing saddle. It is normal for there to be a 3/32" or wider gap between the front plate and the fuselage. This will be covered up by the belly pan when it is installed later.

❑ Carefully align the centerline of the wing, at the trailing edge, with the centerline of the fuselage (the mold seam).

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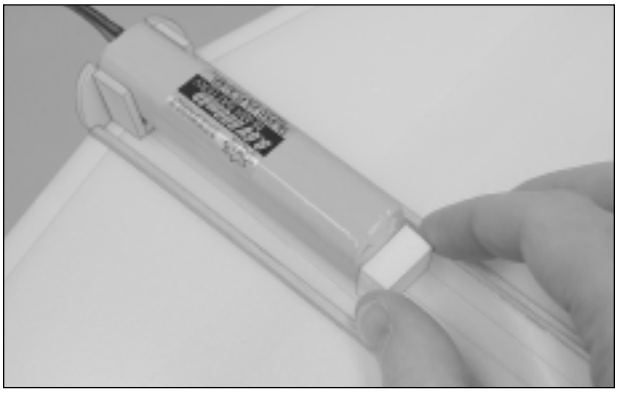
❑ While holding the wing firmly in place and aligned, drill a 5/64" diameter hole into the middle of the plywood plate, 1/4" in front of the trailing edge, and down through the wing screw plate glued inside the fuselage.

❑ Remove the wing from the fuselage and enlarge only the hole in the wing using a 1/8" drill bit.

Step 7: Installing the Fiberglass Belly Pan

❑ Using a modeling knife, cut a 3/4" square piece of foam from the foam packing material included in your kit box.



❑ Set your flight battery onto the wing, making sure the front of the battery is even with the front of the plywood front plate.

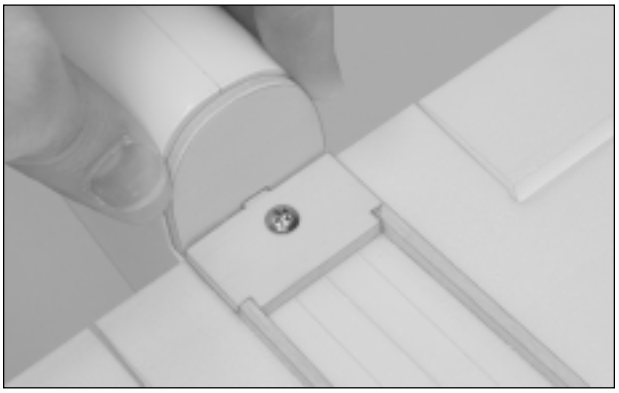
❑ Using 5 minute epoxy, glue the piece of 3/4" square foam to the wing, directly behind your flight battery.

☞ The piece of foam will keep the flight battery from sliding backwards during flight.

❑ After the epoxy has set up, remove your flight battery from the wing.

❑ Place the wing into the wing saddle and secure it into place using the 3mm x 18mm wood screw provided.

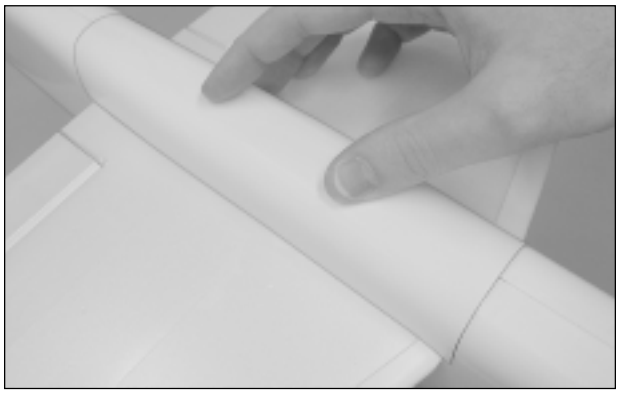
☞ Do not overtighten the screw. You don't want to crush the wing.



❑ Test-fit the plywood plate (rounded w/notch) to the trailing edge of the wing. To align it properly, the notch should fit firmly over the tab and there should be a 1/16" gap between the back of the plywood plate and the fuselage.

❑ When satisfied with the fit, mix a small quantity of 5 minute epoxy and use it to glue the plywood plate into place, being careful not to get any epoxy between the wing and/or plywood plate and the fuselage.

❑ After the epoxy has cured, set the belly pan onto the wing and push it down firmly into place.



❑ Check the fit of the belly pan. To do this, align both the front and back of the belly pan with the sides and bottom of the fuselage. The sides and bottom of the fuselage and belly pan should be even with each other and there should be few or no gaps between the wing and the belly pan.

☞ There should be about a 1/16" gap between the belly pan and the front and back of the fuselage. See the important notice below.

IMPORTANT

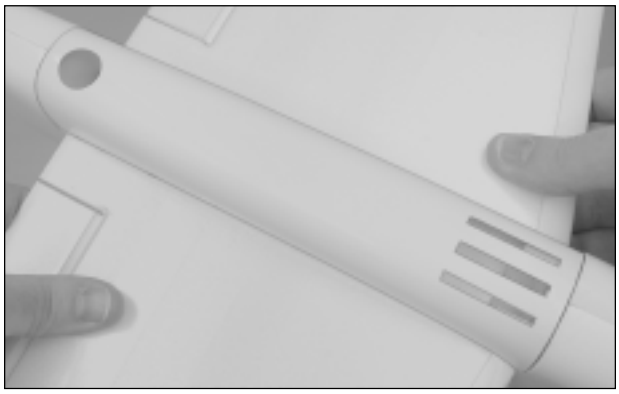
The belly pan is slightly oversize so you will need to sand the front and back of it a bit, using 220 grit sandpaper with a sanding block, to achieve a perfect fit. Remove small amounts of material at a time, checking the fit often. Also, if there are any gaps between the belly pan and wing, carefully sand down the high spots on the belly pan until you are satisfied with the fit.

❑ When satisfied with the fit, glue the belly pan into place using a generous amount of 5 minute epoxy, making sure to apply epoxy to the edges of the front and back plywood plates and to the sides of the balsa support rails. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the belly pan firmly in place and aligned using pieces of masking tape until the epoxy fully cures.

WARNING

Be careful not get any epoxy between the wing and/or belly pan and the fuselage.

❑ After the epoxy has cured, remove the masking tape and check that the belly pan is glued firmly into place. This is important as the belly pan secures the flight battery in place, and, if you're hand-launching the airplane, you'll be holding the belly pan to launch the airplane.



❑ Using a rotary tool with a cutting wheel, carefully make several 1-1/4" long by 1/8" wide air-intake slots in the front of the belly pan.

❑ Using a rotary tool with a sanding drum, carefully cut a 5/8" diameter hole in the back of the belly pan over the wing hold-down bolt. This hole will give you access to the wing screw and also serve as an air-exit hole for cooling the flight battery.

❑ Remove the wing from the fuselage and set them both aside for now.

SECTION 7: STABILIZER ASSEMBLY & INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS:

- ❑ (1) Horizontal Stabilizer w/Elevator Halves
- ❑ (1) Carbon Fiber Dowel
- ❑ (1) Self-Adhesive White Tape
- ❑ (1) Prebent Elevator Joiner Wire
- ❑ (1) Elevator Reinforcement Board - 2 Parts
- ❑ (1) 150mm Balsa Rudder Post

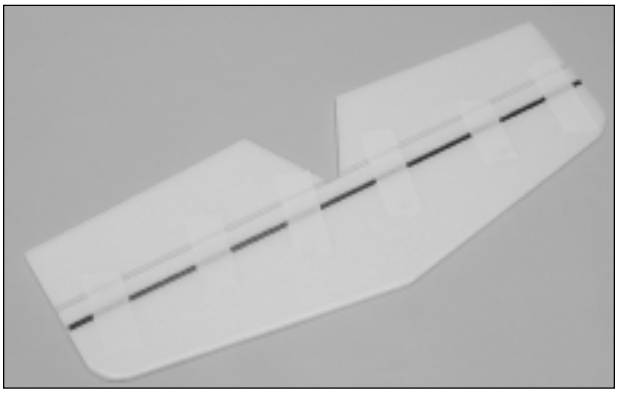
YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond 5 Minute Epoxy
- ❑ Excel Modeling Knife
- ❑ Scissors
- ❑ Ruler
- ❑ Pencil
- ❑ Masking Tape
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Push-Pins
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

Step 1: Installing the Carbon Fiber Dowel

A carbon fiber dowel is provided to strengthen the horizontal stabilizer. For the strongest joint possible, it's important that the dowel be installed correctly. When installing the dowel, two things are very important: the dowel should be glued along its entire length (making sure it is pushed firmly into the precut channel) and the stabilizer must be flat when you glue the dowel into place. This will ensure you don't build a warp into the stabilizer.

❑ Mix a small quantity of 5 minute epoxy and apply a thin layer inside the precut channel in the bottom of the horizontal stabilizer.



❑ Line up the ends of the dowel with the ends of the stabilizer and carefully push the dowel into the channel. Remove any excess epoxy using a paper towel and rubbing alcohol, and use pieces of masking tape to hold the dowel in place until the epoxy sets up.

IMPORTANT

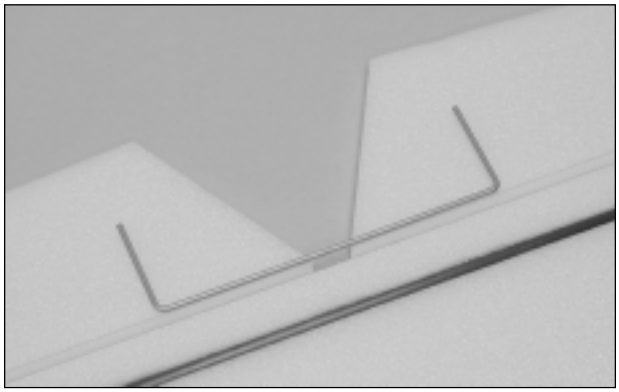
When gluing the dowel into place it's important that the dowel be glued securely into the channel and that the stabilizer be perfectly flat during the drying process.

❑ After the epoxy has cured, remove the pieces of masking tape and carefully sand the ends of the dowel even with the ends of the stabilizer.

❑ Remove the protective backing from the strip of white self-adhesive tape and apply the tape to the bottom of the stabilizer, over the dowel. Trim the ends of the tape even with the ends of the stabilizer using a modeling knife.

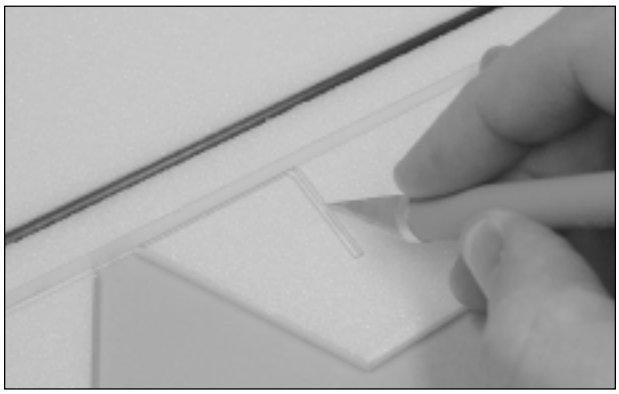
Step 2: Installing the Elevator Joiner Wire

❑ Place the prebent elevator joiner wire onto the bottom of the elevator halves.



❑ Center the wire over the middle of the elevator halves, making sure that the front of the wire is even with the beveled leading edges of the elevators.

❑ When satisfied with the alignment, push the wire down firmly to make an impression of the wire in the foam.



❑ Remove the joiner wire and set it aside.

❑ Using a ruler and a modeling knife, carefully cut a very shallow groove in each elevator half using the impression left in the foam as a guide.

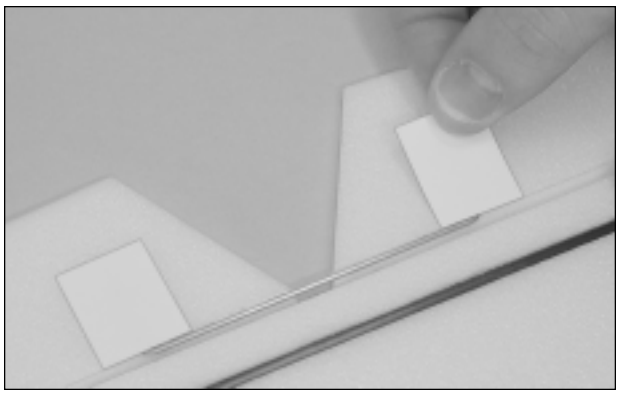
☞ Don't cut too deeply. You don't want to cut through the top of the elevators.

❑ Test-fit the joiner wire into the elevators. When pushed into place, it should be flush with the bottom of the elevators and fit firmly in the grooves. The front of the joiner wire should also be even with the bevel in the leading edge of the elevators.

❑ When satisfied with the alignment, mix a small quantity of 5 minute epoxy and carefully glue the joiner wire into place. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the elevators flat until the epoxy sets up.

IMPORTANT

During the drying process, double-check that the elevator halves are both flat on your work table.



❑ After the epoxy has set up, carefully apply one piece of elevator reinforcement board over each end of the elevator joiner wire.

IMPORTANT

Make sure each piece covers the entire end of the joiner wire.

Step 3: Installing the Balsa Rudder Post

❑ Using a pair of scissors, carefully cut out the stabilizer mounting slot, following the molded scribe line on each side of the fuselage.

☞ The fiberglass is lightweight, so a sharp pair of scissors will cut through it easily and will be more accurate than using a rotary tool with a cutting wheel.

❑ Test-fit the 150mm long balsa rudder post into the back of the fuselage. To align it properly, the back of the rudder post should be flush with the back of the fuselage sides.

☞ You will need to sand the ends of the rudder post to match the curvature of the fuselage at both the top and the bottom.

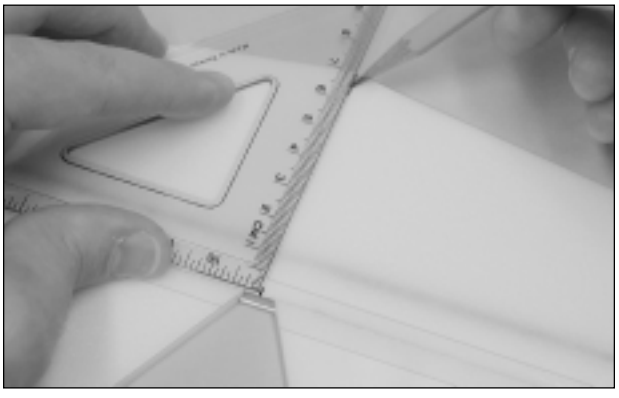
❑ When satisfied with the alignment, remove the rudder post and lightly sand the gluing surfaces on the inside of the fuselage, to roughen the fiberglass.

❑ Glue the rudder post into place using a thin layer of 5 minute epoxy. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the rudder post in place using pieces of masking tape.

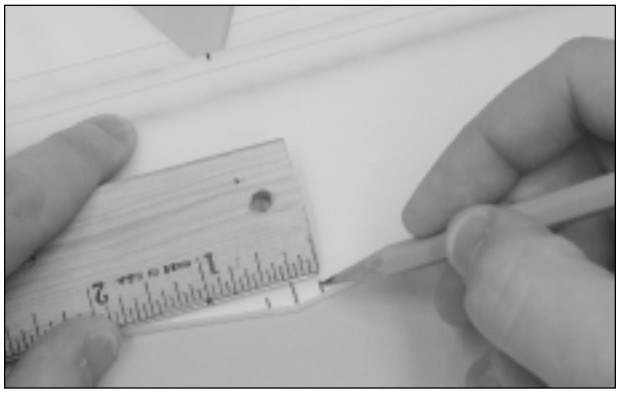
❑ After the epoxy has set up, remove the masking tape and use a modeling knife to carefully cut away the rudder post in the back of the stabilizer mounting slot.

Step 5: Aligning the Horizontal Stabilizer

❑ Using a ruler and a pencil, measure and draw a centerline mark on the top of the stabilizer, at the trailing edge.

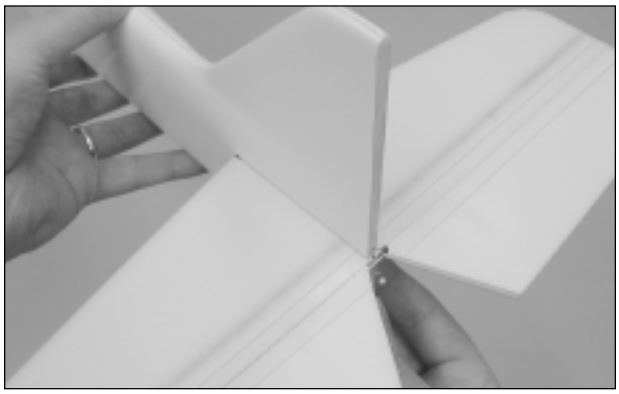


❑ Using a builder's triangle and a pencil, draw a centerline mark on the top of the stabilizer, at the leading edge.



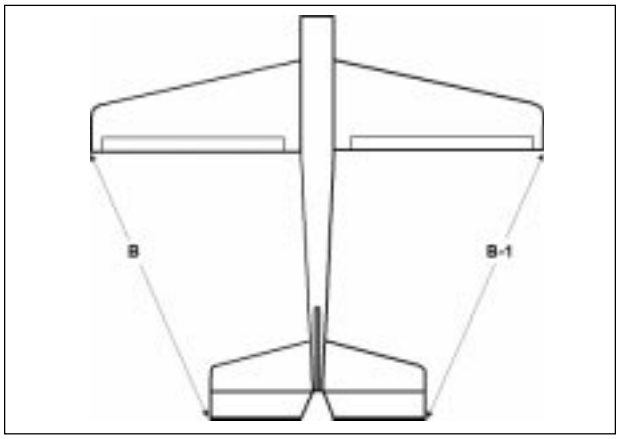
❑ Using a ruler and a pencil, measure out 1/4" from the centerline mark at the leading edge and draw a mark. Do this on both sides of the centerline mark as shown.

❑ Slide the stabilizer into the mounting slot in the fuselage and temporarily align it. The mark you drew on the trailing edge of the stabilizer should be aligned with the centerline of the rudder post and the two marks you drew on top of the leading edge should be lined up with the sides of the fuselage.



❑ Push the stabilizer forward until the trailing edge is even with the back of the rudder post. Use a couple of pins to hold only the trailing edge of the stabilizer aligned at this time.

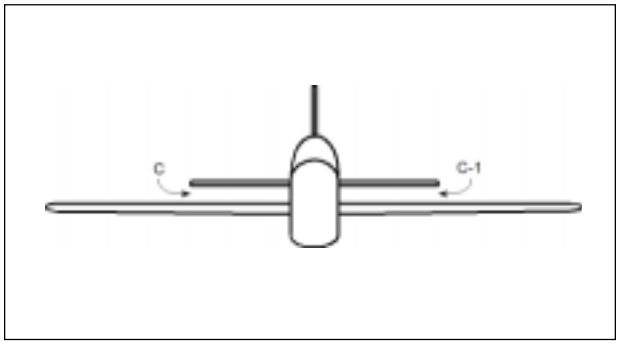
☞ If the stabilizer is hard to slide into place, very lightly sand the edges of the mounting slot. Be careful not to remove too much material, though. The stabilizer should fit snugly.



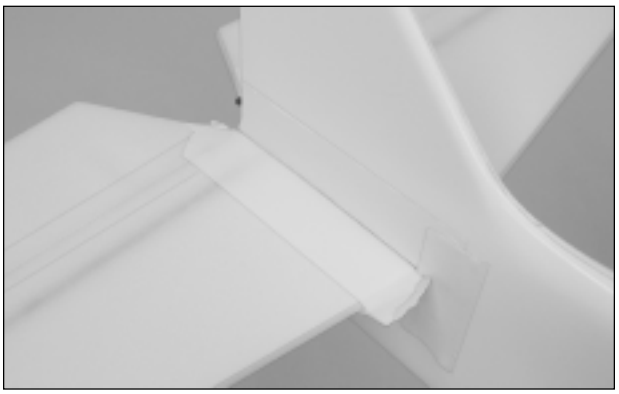
❑ Attach the wing securely to the fuselage.

❑ Check to make sure that the tips of the stabilizer are equal distances from the tips of the wing. To do this, use a ruler to measure from one wing tip to the stabilizer tip on the same side. Do this for both sides. When the stabilizer is aligned properly, both of these measurements should be the same.

❑ When satisfied with the alignment, draw a couple of guide marks on the stabilizer and use a couple of pieces of masking tape to hold the stabilizer in alignment.



❑ Now look carefully from the front of the fuselage at both the wing and the stabilizer. When aligned properly, the stabilizer should be level with the wing. If it is not level, remove the stabilizer and use 220 grit sandpaper to carefully sand down the high side of the mounting slot until the correct alignment is achieved.



❑ When satisfied with the alignment, carefully apply strips of masking tape to both sides of the fuselage (above and below the stabilizer) and to both sides of the top and bottom of the stabilizer, to prevent excess epoxy from getting onto the parts.

☞ Do not actually tape the stabilizer to the fuselage. You will need to be able to remove it to glue it into place.

Step 6: Installing the Horizontal Stabilizer

❑ Remove the stabilizer and lightly sand the inside edges of the stabilizer mounting slot to roughen the fiberglass.

❑ Mix a generous amount of 5 minute epoxy and apply a thick layer to the inside edges of the stabilizer mounting slot and to the gluing surfaces on the top and bottom of the stabilizer.

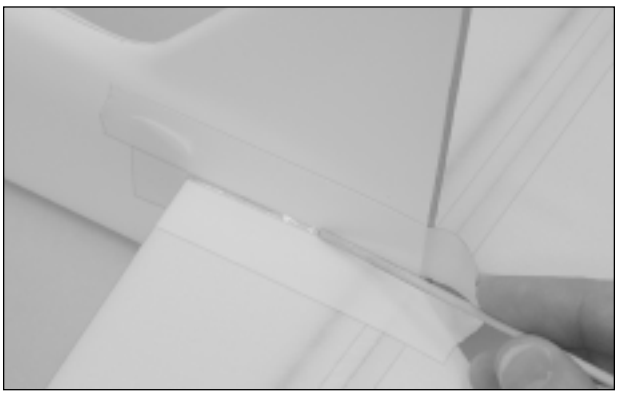
❑ Slide the stabilizer back into place and realign it. Remove the worst of the excess epoxy using a paper towel and rubbing alcohol, and use pieces of masking tape to hold the stabilizer in place and aligned until the epoxy sets up.

IMPORTANT

Before the epoxy sets up, it's important to make sure that the bottom portion of the fuselage is lined up with the top portion. This will ensure that the rudder will line up properly both above and below the stabilizer.

❑ After the epoxy sets up, remove all of the masking tape from the fuselage and stabilizer.

❑ Using the tip of your modeling knife, carefully remove any excess epoxy that might be present along the outside of the glue joints.



❑ Apply strips of masking tape to both sides of the top of the stabilizer and to both sides of the fuselage, leaving a 1/16" space between the glue joints.

❑ Mix a small quantity of 5 minute epoxy and apply a thin bead of it to both glue joints on top of the stabilizer. Wait about 1 minute, then remove the masking tape. The epoxy will smooth out, making a strong fillet that will strengthen the glue joint.

❑ After the epoxy sets up, turn the fuselage over and repeat the same procedures on the bottom of the stabilizer.

WARNING

Do not omit the procedures above. These small fillets greatly strengthen the overall integrity of the glue joints.

SECTION 8: RUDDER & TAIL WHEEL INSTALLATION

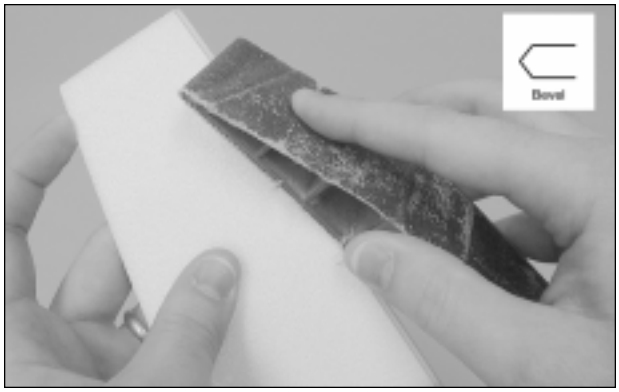
YOU'LL NEED THE FOLLOWING PARTS:

- ❑ (1) Rudder
- ❑ (1) Tail Wheel Assembly
- ❑ (2) 2mm x 5mm Wood Screws
- ❑ (2) Nylon Hinges

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond 5 Minute Epoxy
- ❑ Lightweight Oil or Vaseline
- ❑ # 0 Phillips Head Screwdriver
- ❑ Excel Modeling Knife
- ❑ 1/16" Drill Bit
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

Step 1: Hinging the Rudder



❑ Using 220 grit sandpaper with a sanding block, carefully sand a shallow V-shaped bevel in the leading edge of the rudder.

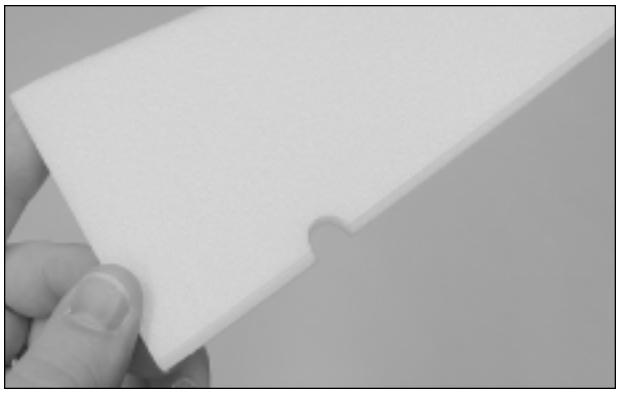
☞ This will allow right and left movement of the rudder while keeping the hinge gap to a minimum.

WARNING

Make sure you sand the bevel into the leading edge and not the trailing edge.

❑ Hold the rudder against the vertical stabilizer, making sure the top of the rudder is even with the top of the stabilizer.

❑ Using a pencil, mark on the leading edge of the rudder the area that must be removed to clear the elevator joiner wire.



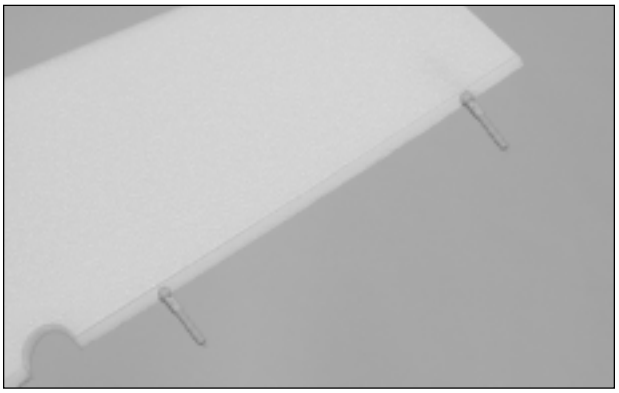
❑ Using a modeling knife, carefully cut away the portion of the rudder to clear the elevator joiner wire.

❑ Using 220 grit sandpaper with a sanding block, carefully round the top and bottom of the rudder to match the contour of the fuselage.

❑ Using a ruler and a pencil, measure down 1/2" from the top of the rudder, at the leading edge, and draw a mark, then measure down 3-1/4" from the top of the rudder, at the leading edge, and draw a second mark.

❑ Carefully hand-drill a 1/16" diameter hole into the rudder, for the hinges, at each of the two marks you drew.

☞ Be careful to drill the holes perpendicular to the leading edge and not at an angle. Also be careful that you don't drill out through the sides of the rudder.



❑ Apply a thin layer of lightweight oil or Vaseline to the pivot point of each hinge.

❑ Mix a small quantity of 5 minute epoxy and glue the two hinges into only the rudder. Remove any excess epoxy using a paper towel and rubbing alcohol, and allow the epoxy to set up.

☞ Push the hinges into the rudder far enough so that one-half of the pivot point is recessed into the leading edge.

❑ After the epoxy has set up, pivot the hinges back and forth several times to loosen the pivot points.

❑ Align the rudder with the back of the fuselage and carefully mark the locations of the two hinges onto the rudder post.

❑ Carefully hand-drill a 1/16" diameter hole into the rudder post at each of the two marks you drew.

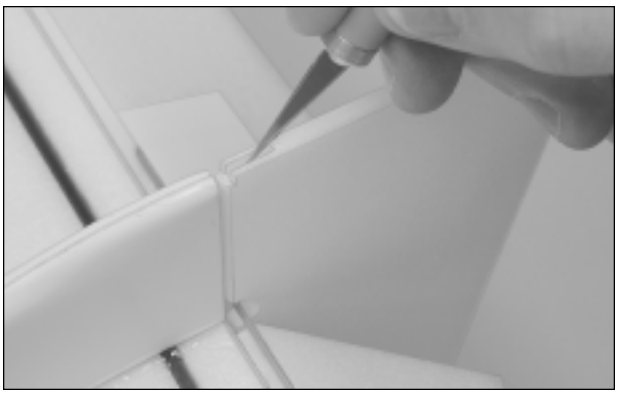
❑ Apply a thin layer of lightweight oil or Vaseline to the pivot point of each hinge.

❑ Hinge the rudder to the fuselage using 5 minute epoxy. Remove any excess epoxy using a paper towel and rubbing alcohol, and allow the epoxy to set up.

☞ When hinged properly, there should be little or no gap between the rudder and the fuselage, and the top of the rudder should be even with the top of the fuselage.

❑ After the epoxy has set up, pivot the rudder back and forth several times to loosen the hinges' pivot points.

Step 2: Installing the Tail Wheel Assembly



❑ Using a modeling knife, carefully cut a thin slot in the bottom of the rudder, deep enough for the tail wheel tiller arm to be pushed down into.

❑ Place the tail wheel bracket onto the bottom of the fuselage. To align the assembly, the tail wheel tiller arm should fit down into the slot you cut in the rudder, the pivot point of the tiller arm should be even with the rudder hinge line and the bracket should be centered in the middle of the fuselage.

☞ You will need to cut a small notch in the leading edge of the rudder for the tiller arm boss.

❑ When satisfied with the alignment, remove the tail wheel assembly and apply a couple of drops of lightweight oil or Vaseline to only the pivot point of the tiller arm.

❑ Mix a small a small quantity of 5 minute epoxy and use it to glue only the tiller arm into the bottom of the rudder. Before the epoxy sets up, carefully secure the plastic bracket to the fuselage using the two 2mm x 5mm wood screws provided.

☞ Make small pilot holes for the wood screws using a 1/16" drill bit.

SECTION 9: GEAR BOX & COWLING INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS:

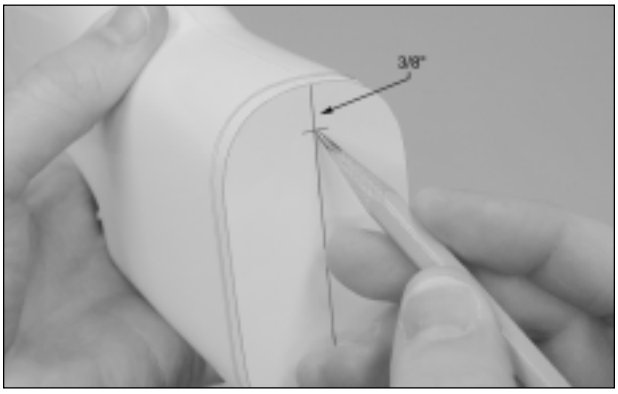
- ❑ (1) Fiberglass Cowling
- ❑ (1) 370 Size Motor w/Gear Box
- ❑ (3) 2.5mm x 12mm Wood Screws
- ❑ (2) 2.5mm x 5mm Wood Screws

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ # 1 Phillips Head Screwdriver
- ❑ Electric or Hand Drill
- ❑ 1/16" & 5/16" Drill Bits
- ❑ Ruler
- ❑ Pencil
- ❑ Masking Tape
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Rotary Tool w/Sanding Drum

Step 1: Installing the Gear Box Assembly

❑ Using a ruler and pencil, draw a vertical centerline on the front of the motor plate.

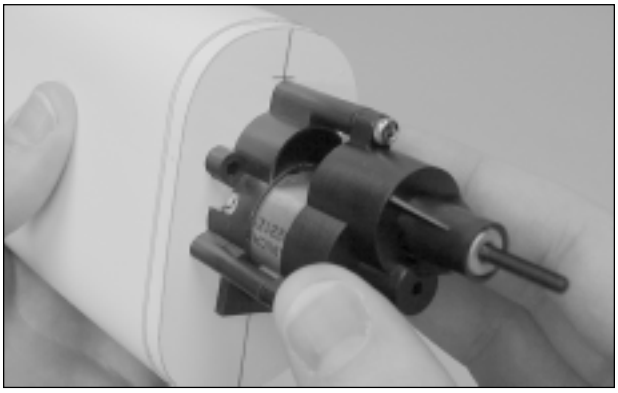


❑ Using a ruler and a pencil, measure down 3/8" from the top of the motor plate and draw an intersecting mark on the vertical centerline.

❑ Measure down 1" from the intersecting mark you drew and drill a 5/16" diameter hole through the motor plate, on the centerline.

☞ This hole will allow the motor wires to pass through into the fuselage.

❑ Slide the motor wires into the hole and push the gear box assembly up against the motor plate.



❑ To align the gear box assembly properly, the gear box should be centered from side to side on the motor plate and the top of the gear box should be even with the mark you drew (3/8" below the top of the motor plate.)

❑ When satisfied with the alignment, use a pencil to mark the locations of the three mounting holes onto the motor plate.

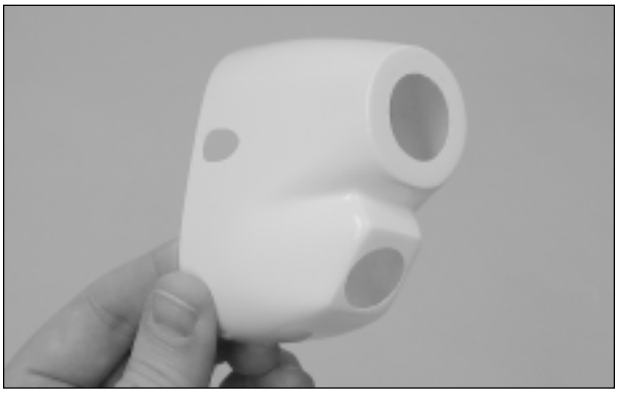
❑ Remove the gear box assembly and set it aside. Using a drill with a 1/16" drill bit, drill pilot holes through the motor plate at each of the three marks you drew.

❑ Set the gear box assembly back into place and realign it.

❑ Install and tighten the three 2.5mm x 12mm wood screws to hold the gear box assembly securely to the fuselage.

☞ Be careful not to overtighten the screws or you might strip the plywood motor plate doubler inside the fuselage.

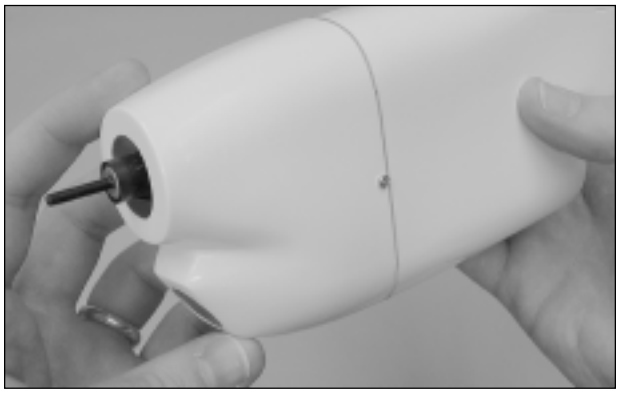
Step 2: Installing the Fiberglass Cowling



❑ Using a rotary tool with a sanding drum attachment, carefully cut out the front of the cowling to clear the gear box.

❑ Using a rotary tool with a sanding drum attachment, carefully cut out the air-intake and air-exit holes in the front and sides of the cowling as shown.

❑ Slide the cowling onto the fuselage and check the fit. The top, bottom and sides of the cowling should be even with the top, bottom and sides of the fuselage, and the front of the cowling should not touch the gear box assembly.



❑ When satisfied with the alignment, secure the cowling into place using two 2.5mm x 12mm wood screws. One screw should be located on each side of the cowling and is threaded into the edge of the cowl mounting lip as shown.

☞ Drill 1/16" diameter pilot holes into the cowling and through the cowl mounting lip to install the wood screws.

IMPORTANT

The front of the gear box will stick out past the front of the cowling. This is necessary to allow alignment of the spinner.

SECTION 10: CONTROL SYSTEM INSTALLATION

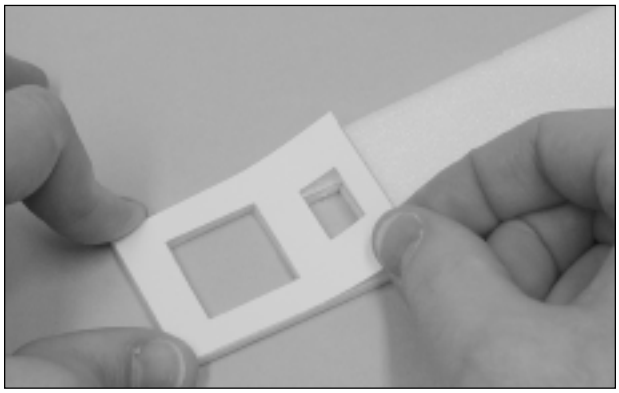
YOU'LL NEED THE FOLLOWING PARTS:

- ❑ (2) 1.5mm x 150mm Threaded Wires
- ❑ (2) 1.5mm x 400mm Threaded Wires
- ❑ (2) Nylon Control Horns
- ❑ (2) Nylon Control Horn Backplates
- ❑ (2) Nylon Adjustable Control Horns
- ❑ (4) Nylon Clevises
- ❑ (1) Foam Radio Tray
- ❑ (1) Servo Mounting Board

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

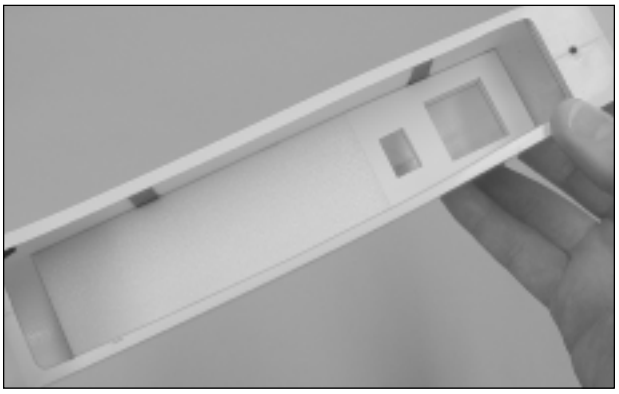
- ❑ # 0 Phillips Head Screwdriver
- ❑ Magnum Z-Bend Pliers
- ❑ Wire Cutters
- ❑ Needle Nose Pliers
- ❑ Excel Modeling Knife
- ❑ Electric or Hand Drill
- ❑ 1/16" Drill Bit
- ❑ Ruler
- ❑ Pencil
- ❑ Rotary Tool w/Cutting Wheel
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

Step 1: Installing the Foam Radio Tray



❑ Remove the protective backing from the die-cut piece of servo mounting board.

❑ Carefully adhere the servo mounting board to the foam radio tray. To align it properly, the back edge of the board should be even with the back of the radio tray and the sides of the board should follow the sides of the radio tray. The holes in the mounting board should also match the holes in the radio tray.



❑ Place the radio tray into the fuselage and temporarily align it. To align it properly, the back edge of the radio tray should be even with, and 1-3/8" below, the back of the wing saddle opening. The radio tray should be flat and parallel to the centerline of the fuselage, too.

☞ If you push the radio tray any further up into the fuselage, the radio tray will cause the fuselage sides to bulge outward.

❑ When satisfied with the alignment, use a pencil to draw a couple of marks on the inside of the fuselage to mark the location of the radio tray.

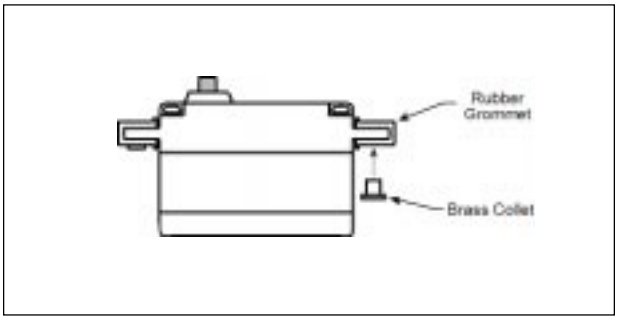
❑ Remove the radio tray and lightly sand the sides of the fuselage where the radio tray will be glued into place.

WARNING

Do not glue the radio tray into place without first sanding the gluing surfaces to roughen the fiberglass. If you omit this procedure, the epoxy will not stick well to the fiberglass and the radio tray could come loose during flight.

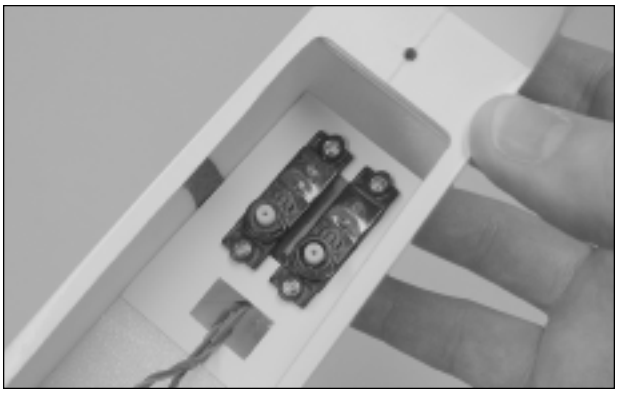
❑ Mix a small quantity of 5 minute epoxy and use it to glue the radio tray into place. Remove any excess epoxy using a paper towel and rubbing alcohol, and gently squeeze the fuselage sides together to hold the radio tray in position until the epoxy sets up.

Step 2: Installing the Elevator & Rudder Servos



❑ Install the rubber grommets and brass collets onto the elevator and rudder servo mounting lugs.

☞ When installing the collets, make sure the flanges are toward the bottom of the mounting lugs.

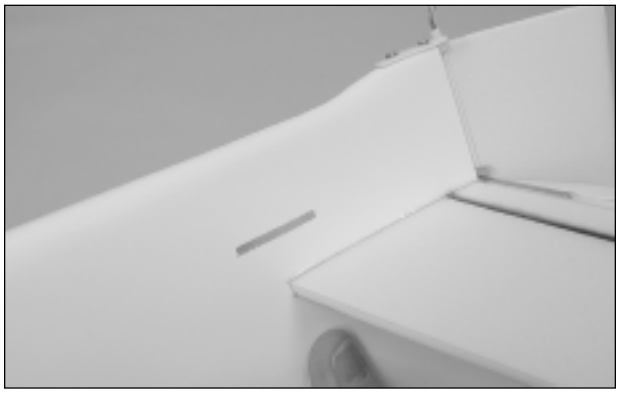


❑ Test-fit the two servos into the radio tray. If the servos are too large to fit, use a modeling knife to enlarge the hole in the radio tray to accommodate the servos.

☞ Both of the servos' output shafts should face toward the front of the fuselage. When installing the servos, run the servo leads out through the small hole in front of the servos.

❑ Mount the servos using the servo mounting screws provided with your servos. To make it easier to install the screws, use the tip of your modeling knife to make small pilot holes in the radio tray.

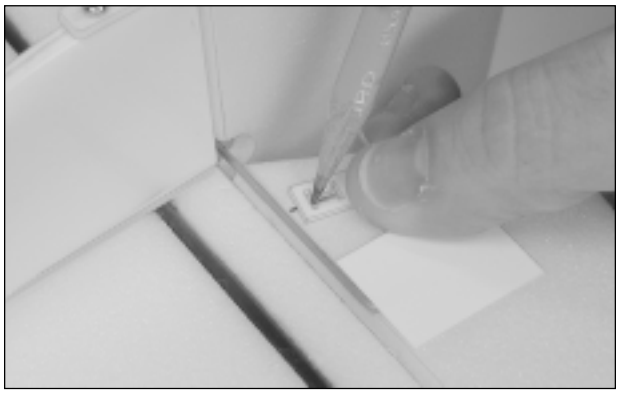
Step 3: Installing the Elevator Pushrod Assembly



❑ Using a rotary tool with a cutting wheel, carefully cut a 7/8" long by 1/8" wide slot in the right side of the fuselage for the elevator pushrod to exit. The middle of the slot should be 1/2" below the stabilizer and 2-5/8" in front of the rudder hinge line.

❑ Using a ruler and a pencil, measure out 3/8" from the inside edge of the right elevator half (at the hinge line) and draw a mark on the bottom of the elevator.

☞ This mark is how far out the nylon control horn needs to be installed on the elevator.

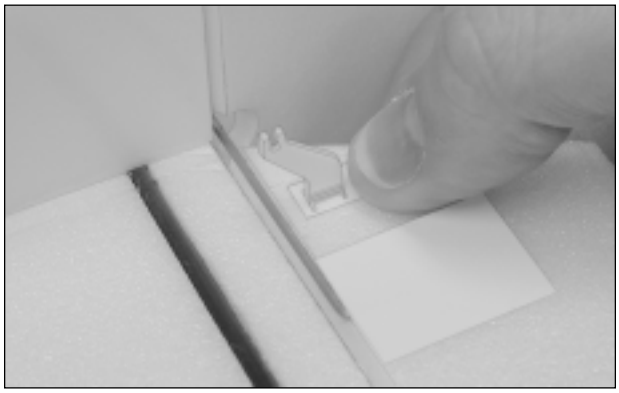


❑ Use a pencil to mark the location and size of the slot that needs to be cut through the elevator to install the nylon control horn. To make this easy, use the control horn backplate as a guide as shown.

☞ So the control horn lines up properly with the pushrod, the slot needs to be angled slightly toward the fuselage side.

❑ Using a modeling knife, carefully cut a slot through the elevator only large enough for the tip of the control horn to be pushed through.

❑ From the top of the elevator, push the control horn up through the slot. When in place, the tip of the control horn should face the bottom of the elevator.



❑ Making sure that the flat portion of the control horn backplate faces away from the elevator, push the backplate over the end of the control horn until you hear it "click" firmly into place.

☞ Because the elevator is thick, we cut a recess in the elevator so that the backplate could be attached without crushing the foam.

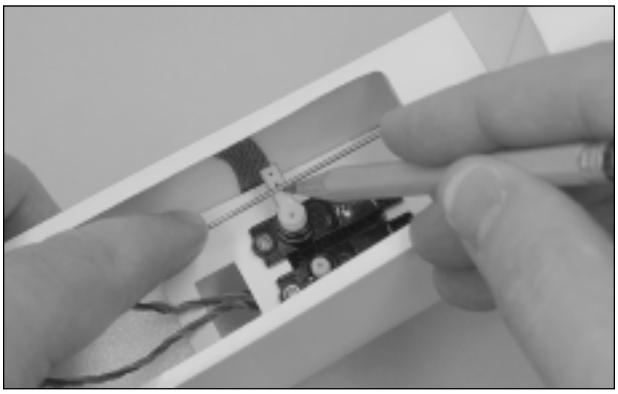
❑ Plug the elevator servo lead (the servo on the left side of the fuselage) into its proper slot in your receiver. Plug the ESC lead into your receiver and plug the flight battery into your ESC . Turn on your radio system and center the servo using the elevator trim lever on your transmitter.

❑ Thread one nylon clevis onto one of the 1.5mm x 400mm threaded pushrod wires. Thread the clevis on far enough to leave room for adjustments later.

❑ Slide the plain end of the pushrod wire through the slot you cut in the fuselage side, then carefully snap the clevis into the elevator control horn.

☞ Before snapping the clevis into place, make sure the plain end of the pushrod wire is not below the radio tray.

❑ Place a "single arm" servo horn onto the elevator servo, making sure that the servo horn is centered and points toward the fuselage side. The arm should have at least two holes in it.



❑ With both the servo horn and the elevator centered, use a pencil to draw a mark on the pushrod wire where it crosses the hole that is 1/4" out from the center of the servo horn.

☞ If you're using Cirrus CS-10 servos this will be the first hole in the servo arm.

❑ Using Magnum Z-Bend Pliers, make a Z-Bend in the pushrod wire at the mark you drew and use wire cutters to remove the excess wire.

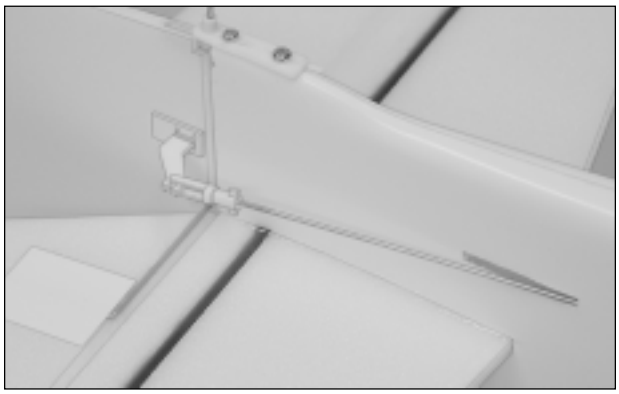
❑ Remove the servo horn. Using a 1/16" drill bit, enlarge the hole in the servo arm that is 1/4" out from the center of the servo horn.

❑ Attach the servo horn to the Z-Bend, then attach the servo horn to the servo, making sure it's centered.

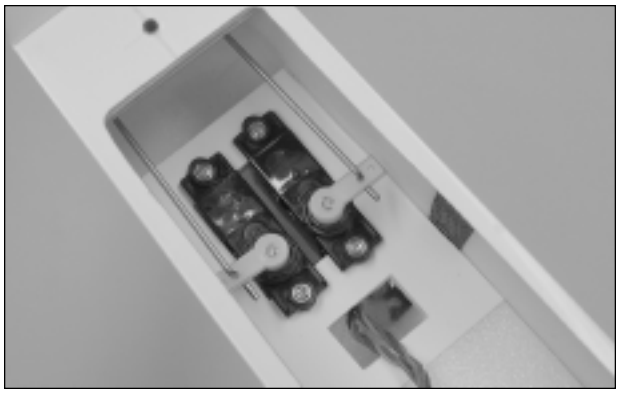
❑ Install and tighten the servo horn retaining screw, provided with your servo, to secure the servo horn into place.

❑ Double-check that the elevator is still centered. If it is out of adjustment, remove the clevis and readjust it until you are satisfied with the alignment. Unplug and turn off your radio system.

Step 3: Installing the Rudder Pushrod Assembly



❑ The rudder pushrod assembly is installed in the same manner as the elevator pushrod assembly, although the rudder pushrod exit slot should be cut in the left side of the fuselage, 5/8" below the stabilizer and 2-3/4" in front of the rudder hinge line. Also, the rudder control horn should be installed 1-1/16" above the bottom of the rudder, perpendicular to the rudder hinge line as shown.

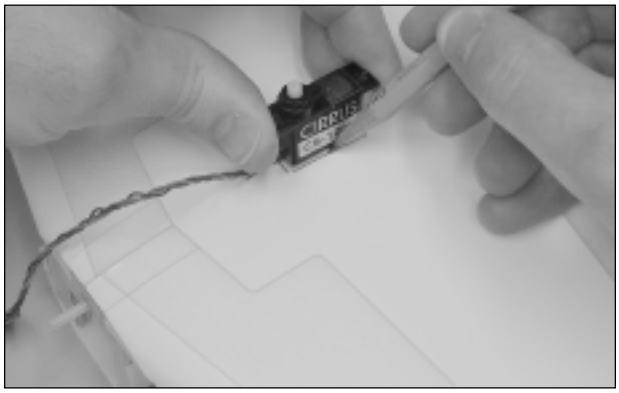


❑ As with the elevator pushrod, the rudder pushrod should be installed into the hole that is 1/4" out from the center of the servo horn.

Step 4: Installing the Aileron Servo

❑ Install the rubber grommets and brass collets onto the aileron servo mounting lugs.

❑ Using a ruler and a pencil, measure back 2-1/2" from the leading edge of the wing (at the centerline) and draw a mark at this location. Do this on the top of the wing.



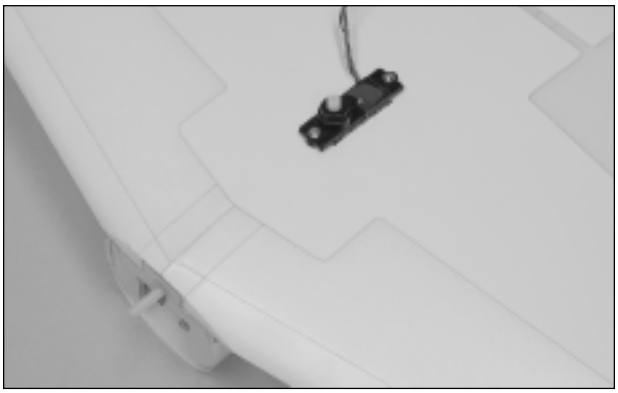
❑ Place your aileron servo on top of the wing, aligning the servo output shaft with the mark you drew.

❑ Center the servo over the wing's centerline and trace around the base of the servo using a pencil.

❑ Using a modeling knife, carefully cut out the wing to accommodate your servo. Don't cut the hole too large, though. The servo should fit tightly.

WARNING

For the servo mounting lugs to fit down against the top of the wing, you'll need to remove as much of the foam as possible from the bottom of the servo cutout. Be careful not to cut through the bottom of the wing!



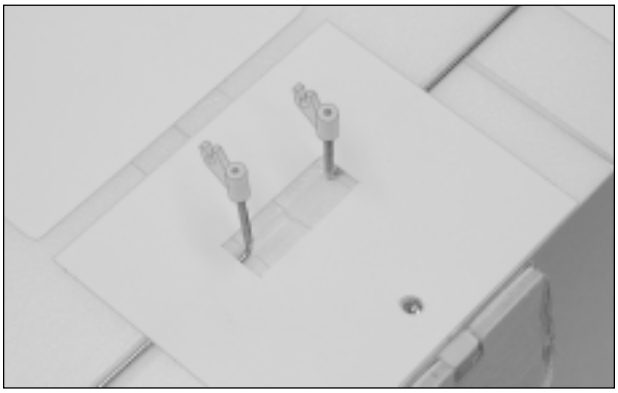
❑ Push the servo into the cutout making sure that the servo output shaft is toward the leading edge of the wing.

☞ You will need to cut a notch in the side of the cutout for the servo wire to exit the top of the wing.

❑ Install the servo using the mounting screws provided with your servo.

☞ To make it easier to install the screws, first punch a small pilot hole through the wing reinforcement board using the tip of your modeling knife.

Step 5: Installing the Aileron Pushrods



❑ Carefully thread the two nylon adjustable control horns onto the aileron torque rods. The openings in the control horns should face up and toward the leading edge of the wing, and the top of the control horns should be even with the top of the torque rods.

IMPORTANT

So both ailerons have the same amount of control throw, make sure that both control horns are even with each other.

❑ Plug the aileron servo lead into its proper slot in your receiver. Plug the ESC lead into your receiver and plug the flight battery into your ESC . Turn on your radio system and center the servo using the aileron trim lever on your transmitter.

❑ Thread one nylon clevis onto each of the two 1.5mm x 150mm threaded pushrod wires. Thread the clevises on far enough to leave room for adjustments later.

❑ Carefully snap each of the clevises into the adjustable control horns.

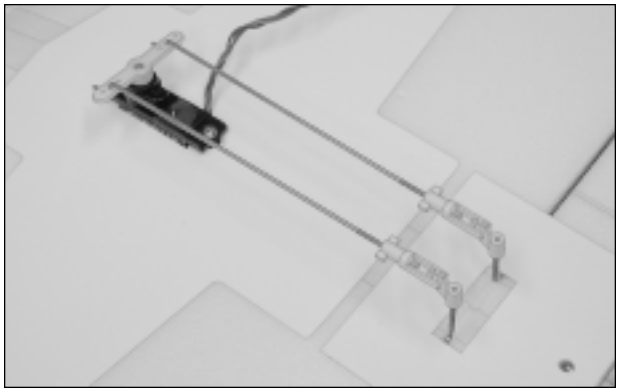
❑ Place a "dual arm" servo horn onto the aileron servo, making sure that the servo horn is centered.

☞ Each arm should have at least three holes in it.

❑ With the servo horn and both ailerons centered, use a pencil to draw a mark on each pushrod wire where it crosses the hole that is 3/8" out from the center of the servo horn.

☞ If you're using a CS-10 servo, this is the second hole out from the center of the servo horn.

❑ Make a Z-Bend in each pushrod wire at the mark you drew. Use wire cutters to remove the excess wire.



❑ Attach the servo horn to the Z-Bends, then attach the servo horn to the servo, making sure that it's centered.

☞ You will have to enlarge the holes in the servo arms using a 1/16" drill bit so that you can attach the pushrods.

❑ Install and tighten the servo horn retaining screw, provided with your servo, to secure the servo horn into place.

SECTION 11: MAIN LANDING GEAR INSTALLATION

YOU'LL NEED THE FOLLOWING PARTS:

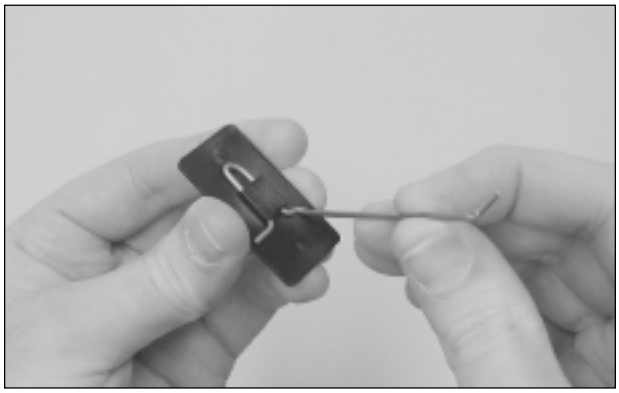
- ❑ (2) Prebent Main Landing Gear Wires
- ❑ (2) Plastic Main Gear Wheels
- ❑ (2) Plastic Main Gear Wheel Retainers
- ❑ (2) Rubber Bands
- ❑ (2) Nylon Main Landing Gear Mounts

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond 5 Minute Epoxy
- ❑ Kwik Bond Thin C/A
- ❑ Ruler
- ❑ Pencil
- ❑ 220 Grit Sandpaper w/Sanding Block
- ❑ Paper Towels
- ❑ Rubbing Alcohol
- ❑ NHP Epoxy Mixing Sticks
- ❑ NHP Epoxy Mixing Cups

If you plan on strictly flying your Tangent EP off of grass we suggest not installing the main gear assembly. The main gear is not necessary for landing on grass and will only cause complication.

Step 1: Installing the Landing Gear Wires

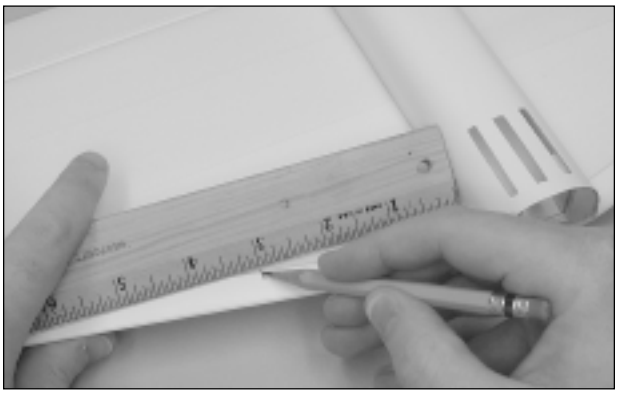


❑ Carefully push the prebent loop in each landing gear wire through the molded slot in the two nylon landing gear mounts.

☞ Make sure the prebent loop is pushed into the slot as far as possible, as shown.

☞ If you ever want to remove the landing gear after it has been glued to the wing, you can simply squeeze the prebent loop together and pull the wire from the nylon mount.

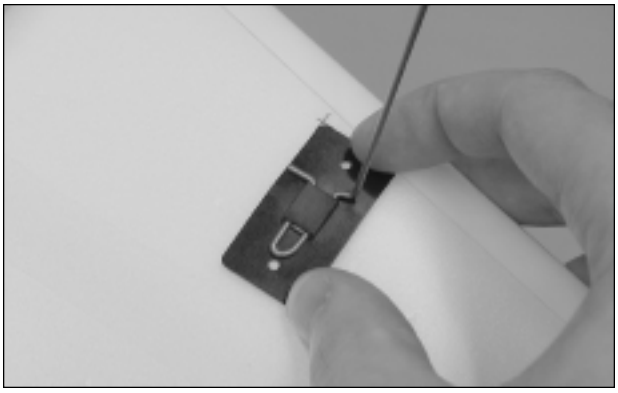
Step 2: Aligning the Landing Gear Assemblies



❑ Using a ruler and a pencil, measure out 3" from the side of the belly pan and draw a mark on the bottom of the wing just behind the leading edge.

❑ Measure back 5/8" from the leading edge of the wing, at the first mark you drew, and draw a second, intersecting mark.

❑ Repeat the same procedures on the other half of the wing.



❑ Place one landing gear assembly onto the bottom of the wing. The inside and front edges of the mounting plate should be aligned with the two marks you drew and the inside edge of the mounting plate should be parallel to the centerline of the wing. This will ensure the landing gear points straight ahead, and not at an angle.

IMPORTANT

The landing gear axle should point out toward the tip of the wing and the prebent coil should be toward the trailing edge.

❑ When satisfied with the alignment, hold the assembly in place and trace around the mounting plate using a pencil.

Step 3: Installing the Landing Gear Assemblies

❑ Remove the landing gear assembly and use 220 grit sandpaper to roughen the bottom of the nylon mounting plate and the surface of the wing where the plate will be glued into place (inside the outline you drew).

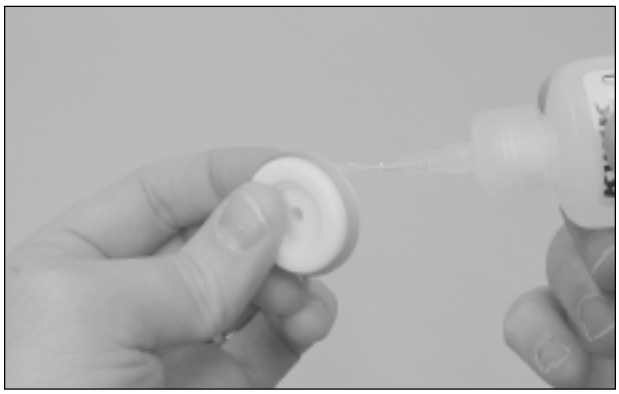
WARNING

Not roughening both the bottom of the mounting plate and the area of the wing where the plate will be glued will result in the landing gear assembly popping off during landing. The gluing surfaces must be roughened for the epoxy to adhere properly.

❑ Glue the landing gear assembly to the bottom of the wing using a generous amount of 5 minute epoxy. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the assembly in place until the epoxy sets up.

❑ After the epoxy has set up, repeat the previous procedures to install the second landing gear assembly on the other half of the wing.

Step 4: Installing the Wheels



❑ Wrap one rubber band over the center of each plastic wheel.

❑ Center each rubber band, then glue them to the wheels using a couple of drops of thin C/A.

❑ Push one nylon wheel retainer into the molded hole in the center of each nylon main gear wheel.

❑ Push one wheel retainer/wheel assembly firmly onto the end of each landing gear axle.

❑ Using a pair of pliers, carefully bend each landing gear strut forward until the wheels are directly below the leading edge of the wing.

SECTION 12: FINAL ASSEMBLY

YOU'LL NEED THE FOLLOWING PARTS:

- ❑ (1) 7.5 x 5 Nylon Propeller
- ❑ (1) Spinner Assembly - Front & Back
- ❑ (2) 3mm Hex Nuts
- ❑ (1) 3mm Flat Washer
- ❑ (1) Prepainted Canopy Cover - Optional
- ❑ (1) Double-Sided Foam Tape
- ❑ (1) Decal Sheet

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:

- ❑ Kwik Bond 5 Minute Epoxy - optional
- ❑ Wire Cutters
- ❑ Adjustable Wrench
- ❑ Excel Modeling Knife
- ❑ Scissors
- ❑ Electric or Hand Drill
- ❑ 5/64" Drill Bit
- ❑ 220 Grit Sandpaper w/Sanding Block - optional
- ❑ Rotary Tool w/Sanding Drum
- ❑ Paper Towels - optional
- ❑ Rubbing Alcohol - optional
- ❑ NHP Epoxy Mixing Sticks - optional
- ❑ NHP Epoxy Mixing Cups - optional
- ❑ K&S 30 Watt Soldering Iron
- ❑ Heat-Shrink Tubing
- ❑ Solder

Step 1: Installing the Propeller & Spinner Assembly

❑ Thread one 3mm hex nut onto the propeller shaft and finger-tighten it until it will not thread on any further.

❑ Slide the propeller onto the propeller shaft, making sure that the back of the propeller slides firmly over the hex nut.

☞ The back of the propeller is molded to fit over the hex nut.

❑ Slide the back half of the spinner assembly onto the propeller shaft and up against the propeller.

❑ Slide the 3mm flat washer into place, then install and tighten the second 3mm hex nut, using an adjustable wrench.

❑ Firmly press the spinner cone onto the back half of the spinner assembly until it snaps into place.

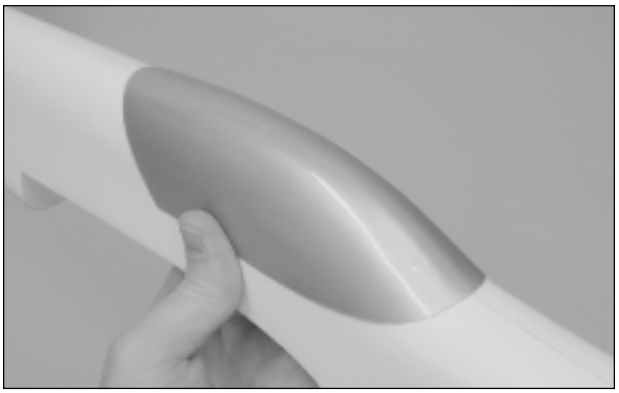
☞ When necessary, the spinner cone can be removed using a small flat blade screwdriver.

Step 2: Installing the Optional Prepainted Canopy Cover

If you don't wish to mask off and paint the canopy yourself, a prepainted plastic canopy cover is provided to simulate the painted canopy. You should not cut out the fiberglass canopy under any circumstances.

❑ Using a pair of scissors, carefully cut out the canopy cover along the molded scribe lines.

❑ Using 220 grit sandpaper with a sanding block, sand the edges of the canopy cover smooth and straight.



❑ Test-fit the canopy cover onto the fuselage. To align it properly, the canopy cover should be pushed down firmly against the surface of the fuselage and the outer edges of the canopy cover should line up with the molded scribe lines in the fuselage.

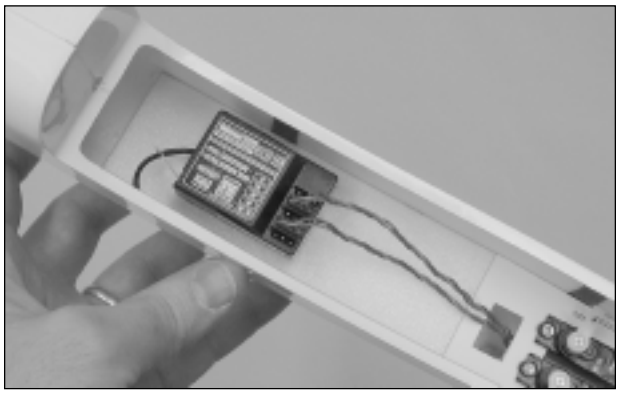
❑ When satisfied with the fit, remove the canopy cover and lightly sand the gluing surfaces inside the scribe lines, to roughen the fiberglass.

❑ Mix a small quantity of 5 minute epoxy and use it to glue the canopy cover into place. Remove any excess epoxy using a paper towel and rubbing alcohol, and hold the canopy cover in place until the epoxy sets up.

Step 3: Installing the Receiver

The locations of the radio equipment shown in the next few steps is only approximate. This is how our test airplanes were set up. The locations of your radio equipment could differ and should be dependent on what type of equipment you use and where you balance your airplane. Balancing will be done in the next section.

❑ Plug the elevator and rudder servo leads into their proper slots in the receiver.



❑ Mount the receiver on the forward section of the radio tray using a small piece of double-sided tape.

☞ Depending on the length of your elevator and rudder servo leads, you may not be able to mount the receiver this far forward. If that's the case, mount the receiver as far forward as allowed by the length of your servo wires.

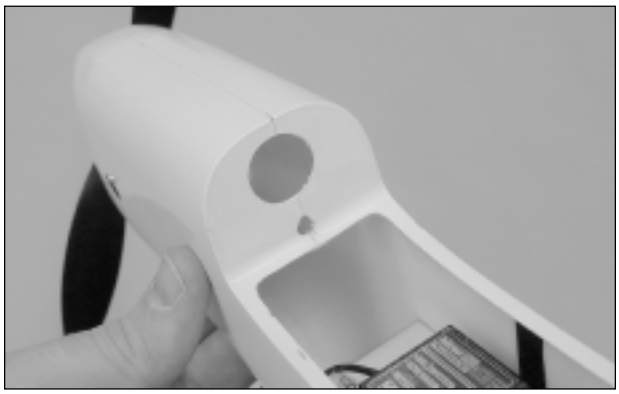
IMPORTANT

If your receiver is too tall to fit on top of the radio tray, or sits so far back on the radio tray that it interferes with the aileron linkage when the wing is mounted, you have the option of cutting a hole in the radio tray and mounting the receiver below the radio tray, against the top of the fuselage. If you do this, don't cut the hole too close to the servos. Doing so can weaken the radio tray unnecessarily.

❑ Carefully drill a 5/64" diameter hole through the fuselage side, near the receiver, for the antenna to exit.

❑ Uncoil the receiver antenna and feed it through the hole in the fuselage. Secure the antenna to the back of the fuselage using a small piece of clear decal.

Step 4: Installing the Electronic Speed Control



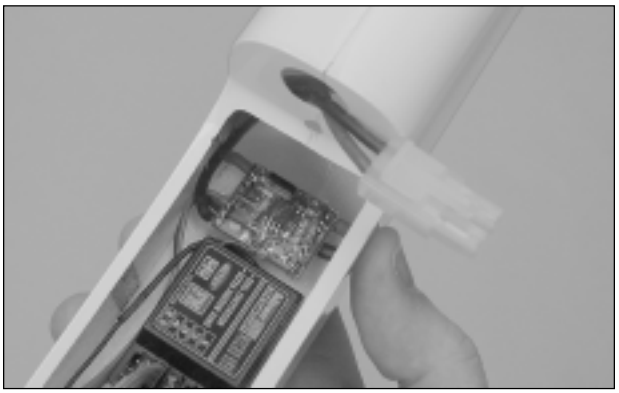
❑ Using a rotary tool with a sanding drum attachment, cut a hole in the front of the wing saddle large enough for your ESC's battery connector to easily fit through.

WARNING

Keep the hole as far away from the wing dowel hole as possible.

❑ Carefully solder the motor wires to your ESC, being careful that the polarity is correct.

☞ Make sure to use heat-shrink tubing to insulate the solder joints.



❑ Feed your ESC's battery connector out through the hole you cut in the fuselage (from inside the fuselage) and mount the ESC to the radio tray, in front of the receiver. Use a small piece of double-sided tape to hold it in place.

☞ If you mounted your receiver farther back than we show, we suggest mounting your ESC as far forward in the fuselage as possible. This will help balance the airplane.

❑ If your ESC has an on/off switch, mount it to the fuselage side, across from the ESC.

☞ Be careful where you mount the switch to make sure it doesn't interfere with the aileron linkage when the wing is mounted.

Step 5: Installing the Flight Battery

❑ Slide the flight battery into the radio tray in the wing as shown.

☞ When you mount the wing to the fuselage, first plug the two battery connectors together, then slide them into the fuselage, through the hole you cut, as you put the wing into place.

Step 6: Applying the Decals

❑ Carefully wipe down the airplane using a paper towel and rubbing alcohol. This will remove any traces of dirt and oil and allow the decals to stick better.

❑ Working with one decal at a time, use a pair of scissors to carefully cut out the decal along its outer edges.

☞ Notice that next to each large decal there is printed its location on the airplane.

❑ Remove the protective backing from the decal and apply the decal to the airplane. (Use the box cover photos to position the decals.) Lightly rub the decal with a soft cloth to remove any trapped air from beneath it.

☞ If any air bubbles form in the decal you can "prick" the bubbles with a straight pin to release the air.

❑ Repeat the steps above to apply the remaining decals. Rub each decal down thoroughly to adhere it into place.

SECTION 13: BALANCING THE TANGENT EP

YOU'LL NEED THE FOLLOWING TOOLS AND SUPPLIES:	
❑ Ruler	❑ Pencil

IMPORTANT

It is critical that your airplane be balanced correctly. Improper balance will cause your airplane to lose control and crash!

Center of Gravity Location:

2-7/8" back from the leading edge of the wing, at the fuselage sides.

WARNING

This location is recommended for initial test flying. The C.G. can be moved forward or aft up to 1/4", but it is not recommended that the C.G. be located any farther back than 3-1/8".

IMPORTANT

As you move the C.G. farther aft, the airplane will become more responsive, especially in pitch. Do not start to move the C.G. back until you are comfortable with the flight characteristics of the airplane.

☞ Balance the Tangent EP with the flight battery installed.

❑ Measure and draw two marks on the top of the wing, 2-7/8" back from the leading edge, at the fuselage sides.

❑ Turn the airplane upside down, place your fingers on the marks, and carefully lift the airplane. If the nose of the airplane falls, the airplane is nose heavy. To correct this, move the receiver and/or ESC back far enough to bring the airplane into balance. If the tail of the airplane falls, the airplane is tail heavy. To correct this, move the receiver and/or ESC forward enough to bring the airplane into balance. When balanced correctly, the airplane should sit level or slightly nose down when you lift it up with your fingers at the C.G. location.

☞ Once you have flown and become familiar with the flight characteristics of the airplane, the C.G. can be moved forward or aft up to 1/4" in each direction to change the flight performance. Moving the C.G. back will cause the airplane to be more responsive, but less stable. Moving the C.G. forward will cause the airplane to be less responsive, but more stable.

Do not fly the airplane beyond the recommended balance range or an uncontrollable crash could result!

SECTION 14: LATERAL BALANCING THE TANGENT EP

Lateral balancing will make the airplane easier to trim and will make it track straighter in the air. It is highly recommended.

❑ Turn the airplane upside down and tie one length of string to the propeller shaft and one length of string to the tail wheel wire.

❑ Carefully lift the airplane up by the two pieces of string. Watch how the wing reacts. If one side of the wing drops, that side is heavier than the other. To correct this, push a small brad or nail into the tip of the lighter wing half.

❑ Lift the airplane up by the pieces of string a couple of more times to double-check your findings. When done properly the wing should stay level consistently when you lift the airplane up by the pieces of string.

SECTION 15: CONTROL THROWS

We recommend setting up the Tangent EP using the control throws listed below. These control throws are suggested for initial test-flying because they will allow the airplane to fly smoother and make it easier to control.

TEST-FLYING

Ailerons:	1/4" Up	1/4" Down
Elevator:	1/4" Up	1/4" Down
Rudder:	1" Right	1" Left

☞ When measuring the control throws, measure from the widest point of the control surfaces.

Once you're familiar with the flight characteristics of the airplane, you might want to increase the control throws to the sport-flying settings listed below. These control throws will make the airplane more responsive and allow you to do most aerobatics with ease.

SPORT-FLYING

Ailerons:	3/8" Up	3/8" Down
Elevator:	5/16" Up	5/16" Down
Rudder:	1-1/2" Right	1-1/2" Left

We do not suggest increasing the control throws beyond the recommended Sport-Flying settings. Higher control throws will cause the airplane to be extremely control-sensitive and result in a possible crash if you are not careful.

SECTION 16: PREFLIGHT CHECK & SAFETY

- Check the operation of the throttle. To do this, do the following:

A) Plug the flight battery into the ESC and turn on the radio system.

WARNING

Do not turn the receiver on unless the transmitter is turned on first. Always turn the transmitter on first. Never allow hands or clothing to get in the way of the propeller when the radio is turned on. Sudden unwanted radio signals, or turning the radio on with the throttle stick set at full throttle, can turn the motor on unintentionally. Always make sure that the throttle control stick is set to idle before turning on the transmitter.

B) When the throttle control stick is at the idle position, the motor should be off. Moving the stick forward should turn on the motor. Gradually moving the stick to the full forward position should result in the motor running at full power.

☞ Some ESCs will give you more proportional control than others. Your ESC may also have a manual control adjustment screw that must be adjusted prior to using the ESC. (Refer to your ESC's operating guide for further information.)

- Cycle the flight battery three times. When NiMH batteries are new they need to be used 2-3 times before they will produce their top voltage and duration. To cycle them, simply charge the battery and then run the motor (at low speed to prevent damaging it) until the motor stops. Allow the battery and motor to cool, then repeat this procedure two more times.

- Check the condition of the transmitter batteries. They should be fully charged.

Continued On Next Page

- Check every glue joint in the airplane to ensure that everything is tight and well-bonded.

- Double-check the balance of the airplane. Do this with the flight battery installed.

- Check the control surfaces. They should move in the correct direction and not bind.

- Check to ensure that the control surfaces are moving the proper amount.

- Check the receiver antenna. It should be fully extended and not coiled up inside the fuselage.

- We do not suggest storing your airplane in an extremely hot environment (like the back of your car in direct sunlight) for any length of time. The extreme heat could cause the foam to melt and possibly damage the fragile components of the radio system, ESC or batteries.

The following are our general guidelines for your safety and the safety of others. Please read and understand these safety guidelines before going out to the flying field for the first time.

- Do not test-fly your model for the first time without first having it safety-checked by an experienced modeler.

- Do not fly your model higher than approximately 400 feet within 3 miles of an airport without having an observer with you. The observer should tell you about any full-size aircraft in your vicinity and you should always give the right-of-way to full-scale aircraft.

- When flying at a flying field with established rules, you should abide by those rules. You should not deliberately fly your model in a reckless and/or dangerous manner.

- While flying, you should not deliberately fly behind the flight line. If your model should inadvertently fly behind the flight line, you should change course immediately.

- You should complete a successful range check of your radio equipment prior to each new day of flying, or prior to the first flight of a new or repaired model.

- You should perform your initial turn after take- off away from the flightline and/or spectator area.

- You should not knowingly operate your R/C radio system within 3 miles of a preexisting model club flying field without a frequency sharing agreement with that club.

SECTION 17: FLYING THE TANGENT EP

The Tangent EP can take off from the ground or be hand-launched. We recommend ground take-offs only from hard smooth surfaces.

Taking Off from the Ground

With the airplane pointing into the wind, apply full power and feed in right rudder to keep the airplane tracking straight as it rolls down the runway. Once sufficient airspeed has been reached, gently apply up elevator to lift the airplane off the ground. Climb out straight ahead in a shallow climb to build up speed. Do not make any steep turns right after take-off or you may stall the airplane.

Hand Launching

Hand Launching should always be done into the wind.

To hand-launch the airplane, gently grasp the belly pan at the C.G. location using your thumb and forefingers. Hold the airplane above shoulder level and turn on the motor to full power. With the motor running at full power, firmly throw the airplane straight ahead and level. Do not throw it up at an angle or throw it too hard or out of control. Let the airplane fly straight and level to pick up airspeed, then climb to your desired altitude. Be careful not to climb too steeply after hand-launching or you could stall the airplane.

In the Air

In the air the Tangent EP is smooth and predictable. At full power, the motor and gear box produce enough torque to pull the airplane through just about any maneuver you want. You'll find that the airplane is responsive to control inputs and handles light winds with ease. When trimmed and set up properly, the Tangent EP goes where you put it and tracks like it's on rails. With the C.G. set toward the back of the range, snap rolls are crisp and very little elevator input is necessary for inverted flight. And because of the generous fuselage side area and highly effective rudder, knife edge flight is very easy. All this results in an airplane that's easier to fly during more difficult maneuvers like 4-point rolls, rolling circles and slow rolls.

Landing

Landings should always be done into the wind.

Prepare for landing by reducing power and making a shallow turn into the wind. (With power off we strongly suggest avoiding high-banked turns.) With the airplane on final approach it will begin to slow down and descend. With the airplane descending, apply small amounts of up elevator to slow the airplane's speed. Just before touch-down, turn the motor off and let the airplane settle near the ground. Flair just before touch-down and you will be rewarded with a soft landing. As always, when landing, be careful not to over-control. Over-controlling leads to excessive oscillations which don't make for good landings. Because the Tangent EP is light and aerodynamically clean, its glide ratio will be higher than what you might expect. For the first couple of landing approaches we suggest that you give the airplane a little more room than normal until you get used to the long glide path to touchdown.

SECTION 18: TRIM CHART

After you have test-flown and done the initial trim changes to the aircraft, use the Trim Chart below to begin trimming your airplane. Following and adhering to this chart will result in the ability to diagnose trim problems and correct those problems using the simple adjustments shown below. Making these observations and related corrections will result in a straighter and truer flying airplane.

TRIM FEATURE	MANEUVER	OBSERVATION	CORRECTION
Control Centering	Fly general circles and random maneuvers	Try for hands-off, straight and level flight	Readjust control linkages so the transmitter trim levers are centered
Control Throws	Fly random maneuvers	A) Too sensitive, jerky controls B) Not sufficient control	If A) Adjust linkages to reduce control throws If B) Adjust linkages to increase control throws
Motor Thrust Angle*	From straight and level flight, chop the throttle quickly	A) Airplane continues in a level path for a short distance B) Airplane pitches nose up C) Airplane pitches nose down	If A) Engine thrust angle is correct If B) Decrease down-thrust If C) Increase down-thrust
Center of Gravity and Longitudinal Balance	From level flight, roll to a 45º bank and neutralize the controls	A) Airplane continues in the bank for a moderate distance B) The nose of the airplane pitches up C) The nose of the airplane drops	If A) Trim settings are good If B) Add nose weight If C) Remove nose weight
Yaw**	Into the wind, do inside loops using only elevator. Repeat test doing outside loops from an inverted entry.	A) Wing is level throughout B) Yaws to right in both inside and outside loops C) Yaws to left in both inside and outside loops D) Yaws to right in inside loops and yaws to left in outside loops E) Yaws to left in inside loops and yaws to right in outside loops	If A) Trim settings are good If B) Add left rudder trim If C) Add right rudder trim If D) Add left aileron trim If E) Add right aileron trim
Lateral Balance	Into the wind, do tight inside loops	A) Wing is level and plane falls to either side B) Plane falls off to the left in loops. Worsens as loops tighten C) Plane falls off to the right in loops. Worsens as loops tighten	If A) Trim settings are good If B) Add weight to right wing tip If C) Add weight to left wing tip
Aileron Rigging	With the wing level, pull to a vertical climb and neutralize the controls	A) Climb continues along the same path B) Nose tends to go toward an inside loop C) Nose tends to go toward an outside loop	If A) Trim settings are good If B) Raise both ailerons very slightly If C) Lower both ailerons very slightly

*Motor thrust angle and center of gravity interact. Check both.

**Yaw and lateral balance produce similar symptoms. Make certain both elevator halves are even with each other and that they both produce the same amount of control deflection throughout the complete deflection range. Right and left references are as if you were in the cockpit.

PRODUCT EVALUATION SHEET

Telling us what you like and don't like determines what model kits we make and how we make them. We would appreciate it if you would take a few minutes of your time to answer the following questions about this kit and your modeling interests. Simply fold this form on the dotted lines, seal with tape and mail it to us. Do not use staples and make sure our address faces out.

Global Hobby Distributors will not disclose the information it collects to outside parties. Global Hobby Distributors does not sell, trade, or rent your personal information to others. Your privacy is important to us.

1) Kit: Wattage Tangent EP Pattern Plane # 128417

2) Where did you learn about this kit?
- ❑ Magazine Ads
- ❑ Hobby Shop
- ❑ Internet
- ❑ Friend
- ❑ Other

3) What influenced you the most to buy this kit?
- ❑ Magazine Ads
- ❑ Type of Model
- ❑ Recommendation
- ❑ Internet
- ❑ Price
- ❑ Box Art
- ❑ Other

4) Did you have any trouble understanding the written instructions? If yes, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

5) Did you have any trouble understanding any of the photographs? If yes, please explain.
- ❑ Yes
- ❑ No

_____
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_____
_____

6) Were any of the kit parts:
- ❑ Damaged
- ❑ Missing
- ❑ Wrong Size
- ❑ Wrong Shape

If you checked any of the boxes above, did you contact our Customer Service Department to resolve the problem?
- ❑ Yes
- ❑ No

7) Was any of the assembly difficult for you? If yes, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

8) What did you like most about this kit?
- ❑ Assembly Manual
- ❑ Hardware Supplied
- ❑ Other
- ❑ Parts Fit
- ❑ Price

_____
_____
_____

9) What did you like least about this kit?
- ❑ Assembly Manual
- ❑ Hardware Supplied
- ❑ Other
- ❑ Parts Fit
- ❑ Price

_____
_____
_____

10) Are you satisfied with the finished model? If no, please explain.
- ❑ Yes
- ❑ No

_____
_____
_____
_____

11) How does this kit compare to similar kits by other manufacturers?
- ❑ Better
- ❑ As Good

What is Your Age Group:
❑ 10 & Under ❑ 11 - 20 ❑ 21 - 30 ❑ 31 - 40 ❑ 41 - 50 ❑ 51 - 60 ❑ 61 - 70 ❑ 71 +

How Many Years Have You Been in the Hobby?
❑ Less than 1 ❑ 2 - 4 ❑ 5 - 7 ❑ 8 - 10 ❑ 11 - 15 ❑ 16 - 20 ❑ 20 or More

How Many Models Have You Purchased In the Last Year?
❑ 0 - 1 ❑ 2 - 4 ❑ 5 - 7 ❑ 8 - 10 ❑ 10 or More

Please List any Other Modeling Interests or any Additional Information about This Product: _____
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